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CLASSIFICATION OF THE BANANAS.

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III. Critical Notes on Species*

e. Musa basjoo *Siebold* in Verh. Batav. Gen. **12** (1830) 18.

The reference is to : Ph. Fr. Siebold, Synopsis Plantarum Oeconomicarum universi regni Japonici, in Verhandelingen van het Bataviaasch Genootschap, 12de Deel (1830) p. 18.

The name was apparently published without description. I have not been able to consult the original, but a manuscript slip among herbarium specimens at Kew purports to be an extract therefrom and reads as follows :

" *M. basjoo* Japon. (v.v.h.b.). Ex insulis *Liukiu* introducta, vix asperitati hiemis resistens. Ex foliis linteum, praesertim in insulis *Liukiu* ac quibusdam insulis provinciae *Satzuma* conficitur. Est haud dubie linteum, quod Philippinis incolis audit *Nippis*".

A plant flowered in the Temperate House at Kew in 1891 and was figured in the *Botanical Magazine* (t. 7182) with an accompanying description by J. G. Baker. Five sheets of material from this plant are preserved in the Kew Herbarium and may be regarded as the type specimen.

The species is one of the best known in the genus on account of its ability to grow out of doors in cool climates. According to De Wildeman (1912) it was first introduced into France, by Thibaut and Keteleer who gave it the name of *Musa japonica*. In England it was introduced into cultivation by Messrs. Veitch of Chelsea, and both name and synonym are given in *Hortus Veitchii* (1906) p. 215. The popularity of the species may be gauged from the fact that *Index Londinensis* lists eleven illustrations of *M. basjoo* and six of *M. japonica* in various horticultural publications.

A clone in the I.C.T.A. collection (Introduction no. 78A) was obtained for us by Mr. Coutts, Curator at Kew, from Devonshire in 1933 and is regarded as true to label. There is a slight discrepancy between our material and Baker's description in the bract colour, which Baker gives as " dull brown".

* Continued from K.B. 1948, p. 157

In every other respect, including shape of bracts and bud, floral characters and fruit characters, our plant agrees with Baker's description and the Kew material, but its bracts are greenish-yellow, though sometimes with a slight brownish twinge. The difference is not regarded as important. It may be that the bract colour in the Kew plant was modified by the conditions under which it was grown, for Kurz (1865) described *M. basjoo* as having " spathes yellow".

In flowering, *M. basjoo* raises several bracts at once, and in this respect resembles *M. balbisiana* Colla, but in other characters and especially its rather large flattened seed it is quite distinct. The species has no obvious close connections with the edible bananas, and it crosses with other *Musa* species less readily than most ; hybrids in which it is the female parent usually show weakness from their earliest stages. Though said to be grown in Southern Japan for its fibre, it does not appear to have been investigated as a potential fibre plant elsewhere, nor does our material seem to have any value in that respect.

Our plant may be described thus :

M. basjoo Siebold in Verh. Batav. Gen. XII. 18 (1830) ; Baker in Bot. Mag. t. 7182 (1891) et in Ann. Bot. 7. 210 (1893) ; De Wildeman in Ann. Mus. Colon. Marseille. Ser. 2. 10. 322 (1912): *M. japonica* Hort. Veitch. 275 (1906) ex Rev. Hortic. 60. 491 (1888).

Plant stooling rather sparsely ; pseudostems about 2 m. 50 high, green or yellowish green as far as visible, but usually hidden in the lower part by persistent withered leaf bases ; upper parts of leaf-sheaths lightly black-blotched, scarcely perceptibly waxy. Leaf blades about 1 m. 50 long, 55 cm. wide, medium green above, paler beneath but scarcely glaucous ; midribs pale green above and beneath ; petioles about 30 cm. long, with prominent margins, widening from 0.5 cm. at the top to 1.5 cm. at base, spreading throughout the length and not clasping the pseudostem at base.

Inflorescence at first horizontal, the bud turning down immediately after the change of sex ; peduncle very minutely puberulent ; sterile bracts commonly 3, the first leaf-like with considerable development of lamina, the next tipped with lamina, the last completely bractlike but green ; basal flowers female, the number of female " hands " varying up to about 6, upper flowers male.

Female flowers 10–16 per bract in two rows ; ovary 4–5 cm. long, bright green, glabrous ; compound tepal 4–4·5 cm. long, white, its tip and lobes deep yellow, the lateral lobes 5 mm. long, with a minute dorsal appendage or none ; free tepal 4 cm. long, boat-shaped in the lower half only, the upper half ligulate corrugate narrowing gradually to an acute apex terminated by an apicula 7 mm. long ; staminodes 5, all as long as the perianth, exceeding the style and stigma ; style stout, stigma 7 mm. across.

Male bud in advanced blooming very broadly ovoid, obtuse, the bracts imbricate at the tip. Bracts yellowish-green outside, sometimes with a brownish tinge, dull but scarcely glaucous, sulcate, pale yellow within and transversely corrugate between the ridges ; broadly ovate, nearly as broad as long if flattened out, rounded at apex. Two or more bracts lifted at the same time, soon deciduous after flowering.

Male flowers about 20 per bract, in two rows ; compound tepal about 5 cm. long, 1·2 cm. wide, cream with yellow tip and lobes, the outer lobes narrow oblong, 5 mm. long, with a spine-like dorsal appendage barely exceeding 1 mm. ; free tepal lanceolate, long-acuminate, nearly 4 cm. long altogether, boat-shaped in the lower 2·5 cm., the upper 1·5 cm. narrowing gradually to an extremely fine point, this upper part becoming corrugated and revolute as the flowers age ; stamens at first slightly shorter than the style and perianth, later well exserted and revolute.

Fruit bunch compact, nearly horizontal, its peduncle pubescent ; individual fruits 5–7 cm. long, 2–3 cm. in diameter, 3–5 angled, tapering to the base into a short (0·5 cm.) pedicel, at apex rounded obtuse with a short conspicuously angled stylar callosity. Pericarp about 2 mm. thick, greenish yellow at full ripeness ; pulp white.

Seeds black, warty, irregularly angulate, dorsiventrally compressed, 6–8 mm. across and 4 mm. high.

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III. Critical Notes on Species

f. Musa nagensium *Prain*, in Journ. Roy. As. Soc. Beng. **73** : 21 (1904).

This species was described by Prain from a plant that flowered in the Royal Botanic Garden at Calcutta, the rootstock having been collected originally in the Naga Hills of Assam. There are unpublished drawings as well as dried material of it in the Kew Herbarium.

It occurs also in the Myitkyina district of Upper Burma, some 200 miles from its type locality, whence it is represented in Herb. Kew. by *Parkinson* 1759 (cf. C.E.C. Fisher in *Kew Bull.* 1931, p. 28). The I.C.T.A. collection has a plant (Introduction no. 188) also from the Myitkyina District. It was raised from seeds sent by C. W. D. Kermode Esq. in July 1939, labelled Ngapyaw-nwe. This plant is not very vigorous under Trinidad conditions and has only flowered once, but there appears no doubt about the correctness of its determination. Detailed description and photographs are not available at present, but will be supplied later if the plant survives.

Meanwhile it is desired to draw attention to the distinctiveness of *M. nagensium* from other well-described members of the section *Eumusa*, and to the fact that it has one or more imperfectly known relatives which may ultimately form with it a well-defined sub-section within the section.

The conspicuous characteristics of *M. nagensium* are, its very slender and graceful pseudostem, with the slender-petioled leaves borne more remote from each other than is usual in *Eumusa* ; its long and narrow male bud, a consequence of the bracts also being comparatively remote on the slender rachis ; and, especially, its large seed. Prain adds that the fruits, instead of being recurved as in most species, " point persistently

forward and downward in the direction of the apex of the long pendulous rachis" : I have had no opportunity to observe whether our material conforms in that respect.

The seed is of the usual *Eumusa* shape and structure, but about twice the diameter and by volume some four or five times the size of that of any other well-known species of *Musa* (excluding *Ensete*) ; and in view of the generally narrow range of variation in seed size in the genus this character is particularly striking. The seed is, however, matched by those of certain less well known forms in Sikkim, and this appears to be an appropriate place for a note on *Musa sikkimensis* and its allies.

Allied Species

The name *M. sikkimensis* is due to S. Kurz, and occurs in his unfinished paper on *Musa* in *Journ. Agric. Hort. Soc. India* N.S. 5 of 1878 (p. 164). It occurs only in a synoptic key, but we are able to deduce these characters : Plant stoloniferous ; spathes imbricate, channelled, more or less pruinose outside ; petioles elongate ; pseudostem columnar. They lead to two species—*M. sapientum* (which as used by Kurz applies to *M. balbisiana* Colla) with " spathes often crimson inside ; seeds turbinate-globular to polyhedrous, tubercled, not above 2 lines thick " and *M. sikkimensis* with " spathes dull-purple ; seeds depressed and irregularly angular, tubercled, 4–5 lin. in diameter".

Closeness of relationship is not necessarily implied by juxtaposition in a key ; but these two very different species have apparently remained closely associated in the literature through a curious accident. J.G. Baker in his " Synopsis of the genera and species of Museae " (*Ann. Bot.* 7 : 213. 1893) deals with the record in these words :

> Kurz, in Journ. Agric. Hort. Soc. Ind. V. 164, distinguishes two species, *M. sapientum*, with spathes often crimson inside, seeds turbinate-globular to polyhedrous, tubercled, not above $\frac{1}{6}$ in. diam. and *M. sikkimensis*, with dull purple spathes and seeds depressed and irregularly angled, tubercled, 4–5 lines diam. Of the latter we have careful sketches made on the spot by Sir. J. D. Hooker and it has been widely distributed as Musa No. 5 of Hooker, and Thompson's Indian plants.

The " careful sketches made on the spot by Sir J. D. Hooker " must refer to certain drawings preserved in the Kew Herbarium. One of them is labelled " 4 Musa. Wild banana Sikkim. Banana of lower regions" : it shows seeds of the *nagensium* type, a glaucous fruit, and a bract, pinkish purple on the outside and yellow within. Another is " 5 Musa Sikkim Ic. J. D. H. Banana of *upper* regions. Young fruit not glaucous. Scales broader, male flowers much larger " : this again shows seeds of the *nagensium* type, slightly larger than those of " 4 Musa", a short broad fruit, 4 inches long by $2\frac{1}{2}$ inches diameter, angular trigonal, and a bract of which the inside is brown, with some indication that the outside was purple with a yellow tip. A third sketch is a seed drawing labelled " Wild Plantain 10–15 ft. Kala Panee, Khasia. 5 Musa. Ic. J. D. H."

These drawings, whether of two good species or of two varieties of a variable species, definitely show plants quite distinct specifically from *M. balbisiana*. Yet there are also in the Kew Herbarium two sheets of

dried material, one labelled " 4 Musa Sikkim (Herbarium Hookerianum) Wild banana of Hot Valleys, Sikkim, Himal." and the other " 5 Musa Sikkim (Herb. Hooker.)", and both are indubitable *M. balbisiana* having nothing to do with the similarly labelled sketches. A mistake in labelling has occurred somewhere, and Baker's failure to detect it is astonishing. I assume that what " has been widely distributed " as Musa No. 5 is simply *M. balbisiana* like the Kew sheet, and not the " 5 Musa Sikkim Ic. J. D. H." at all. I also assume that Baker must have placed more confidence in the material than in the drawings ; otherwise he would surely have treated so distinct a species, although imperfectly described, in some better way than by leaving it under " *M. sapientum* L. subsp. *seminifera* Lour."

Under the same heading, Baker goes on to mention " four wild seminiferous forms in Sikkim " distinguished by Dr. King as 1. *pruinosa*, 2. *dubia*, 3. *hookeri* and 4. *thomsoni* and adds : " Dr. King thinks the two latter forms as likely to be distinct specifically from *sapientum*. His Hookeri is probably *M. sikkimensis* Kurz". There is material of these forms also in the Kew Herbarium, which may help to settle the nomenclature when the plants have been further studied on living specimens, but the first requirement is to determine by re-collection how many of the large-seeded species there are in Sikkim.

I can only add from personal observation that in 1931 we received two lots of seed from the Superintendent of the Royal Botanic Garden, Calcutta, which have some bearing on the discussion. One was labelled " Lepchea name Raling Kurdong". The name suggests comparison with the " Reling " given by King as the Lepcha name of his *pruinosa* : the plants raised were *M. balbisiana*. The other seeds were of the *nagensium* type and labelled " Lepchea name Ruxom Kurdong". This name might be compared with " Luxon " given by King for his *dubia*, and the added note " altitude from 1500 to 5500 ft." also corresponds with the notes on *dubia*. We succeeded in raising only one plant, and unfortunately that died before we could establish a clone, but writing from memory I am sure that it was different in vegetative habit from *M. nagensium*. The conclusion is that *M. nagensium* has at least one close relative in Sikkim and possibly more than one, but that the Sikkim forms cannot be adequately described or even accurately named until they have been re-collected and studied as living plants.

It may be observed that Prain, in his notes on *M. nagensium*, distinguishes that plant carefully from " *Musa paradisiaca* Linn., subspecies *seminifera* Lour., var. *pruinosa* King, from Sikkim " but does not mention Hooker's plants. The omission suggests that there was no material of the large-seeded Sikkim forms at Calcutta at the time.

A natural hybrid

It is worthy of record that when we raised seedlings from the seeds of *M. nagensium* received from Burma there was one plant in the nursery quite different from the rest. This was planted under a separate number, flourished, and in due course flowered. It is far more vigorous than the true *nagensium*, tillers freely, and reaches a height of 5–6 metres ; it has, however, so far been quite sterile, producing no seeds and only defective pollen.

From its phenotypic characters I have no doubt that this plant is a natural hybrid of *M. nagensium* with *M. balbisiana*. We know that *M. balbisiana* occurs in the same district, because we received seeds of it at about the same time, and no other explanation seems equally reasonable. Although we not infrequently get natural hybrids from open pollinated bunches in our collection, where the chances of cross-pollination are very high, this is, I believe, the first record of a natural cross between two distinct species of *Musa* in the wild state. It serves to show that an odd plant found in the wild may not always be a new species, and the careful collector should bear in mind the possibility of natural crossing where two or more species are present in the vicinity.

WINTER FLORA ON THE ATHOS PENINSULA.

W. B. Turrill.

In *K.B.* 1937, 197–273, there was published a " Contribution to the Botany of the Athos Peninsula". This account was based on collections made in the spring and summer of 1934. Recently a small collection of dried plants from the same area has been received from Lt.-Col. R. S. Vine. Amongst the specimens are several species additional to those recorded in the paper mentioned above, but the chief interest of the collection is connected with the time of the year in which it was made, namely 18–19 December, 1946. The plants were collected either around Vatopedi or between Vatopedi and Karyes. Vatopedi is a large Greek monastery on the east coast of the peninsula, and Karyes is the head-quarters of the monastic government and is situated near the centre of the peninsula. The localities were probably all low-lying, and the flowering of many of the species is an indication of the mildness of the winter climate which is of Mediterranean type at the lower altitudes.

The following is a list of the specimens, which were collected in flower (or flower and fruit) unless otherwise stated : *Berteroa orbiculata* DC., *Lepidium graminifolium* L., *Silene cucubalus* Wib., *Hypericum perforatum* L., *Oxalis corniculata* L. (young fruit), *Euonymus japonicas* Thunb. (in fruit), *Umbilicus pendulinus*DC. [*Cotyledon pendulinus* (DC.) Batt.], *Daucus carota* L., *Lonicera etrusca* Santi (in fruit), *Bellis silvestris* Cyr., *Crepis pulchra* L. (abnormal form), *Erigeron canadensis* L., *Hypochoeris glabra* L., *Inula viscosa* L., *Senecio jacobaea* L., *Campanula athoa* Boiss. et Heldr., *C. persicifolia* L., *Arbutus unedo* L., *Erica verticillata* Forsk., *Solanum pseudocapsicum* L., *Antirrhinum majus* L., *Ballota nigra* L., *Calamintha officinalis* Moench., *C. vulgaris* (L.) Druce (in fruit), *Origanum hirtum* Link, *Thymus* sp. (? *T. montanus* W. et K. var., in fruit), *Phytolacca americana* L., *Laurus nobilis* L. (in young flower bud), *Euphorbia oblongata* Griseb. (old infructescences), *Mercurialis annua* L., *Parietaria diffusa* M. et K. (*P. vulgaris* Hill sensu Hayek), *Quercus ilex* L. (in fruit), *Smilax aspera* L. (vegetative only).

In addition, the following Vascular Cryptogams (determined by F. Ballard) were represented in the collection : *Adiantum capillus-veneris* L., *Asplenium adiantum-nigrum* L., *Asplenium trichomanes* L., *Ceterach officinarum* Lam. et DC., *Polypodium vulgare* L., and *Selaginella denticulata* (L.) Link.

INSECTICIDES DERIVED FROM PLANTS.

Results of Tests Carried out on a Number of British, Tropical and Chinese Plants.

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Summary.

A number of plants, British, tropical and Chinese have been tested for insecticidal activity.

(1) The earlier tests were all made with extracts of the ground-up material. Later it was found that the ground material itself could show definite toxicity where little or none showed in an extract.

(2) When tested as extracts, although some of the British plants possessed some insecticidal properties, none was of a sufficiently high standard to be worth further examination, with the possible exception of the fruits of *Eunonymus europaeus*.

(3) Extracts of tropical plants showed some activity as contact and stomach poisons or as repellents, but none approached in potency known plant or synthetic insecticides. When tested as powders, *Randia nilotica* (root) from Nigeria and *Randia dumetorum* from Ceylon showed some toxicity.

(4) Of the Chinese plants submitted to us, *Milletia pachycarpa* deserves most consideration as an insecticide of the Derris class, although not so powerful in its toxic action as the most recent strains of *D. elliptica* root. The fact that the seed possesses insecticidal properties adds interest to this plant. The seeds should be easier to harvest than the roots. With this plant too, notable differences in activity were found when extracts were compared with the ground-up material. *Derris fordii* (root), *Tripterygium wilfordii* (root bark) and *Rhododendron molle* (flowers) all showed definite insecticidal activity as powders.

Some of the differences in effect between extracts and powders may be due to specificity, but there seem to be other factors, which cannot be as yet established, which we regard as important and hope to investigate.

Introduction.

During the years 1939-1942, it was considered advisable to make an examination of certain British plant extracts as contact insecticides, since a shortage of the more potent of them was certain, due to the demands of the services and to the lack of shipping facilities. On the entry of Japan into the war there was a loss, not only of the supplies of Japanese pyrethrum, but of Malayan derris. The world shortage of these insecticides might have become serious, had not supplies of East African pyrethrum and South American Lonchocarpus roots been available. A preliminary survey was therefore made of native plants with a reputation for insecticidal action, and of such other foreign ones which might prove of some value in particular localities within easy reach of their occurrence. The

discovery of certain synthetic insecticides of considerable potency rendered intensive work on these plant products at the time unnecessary. It is thought, however, advisable to put on record a brief account of the results obtained. These investigations were carried out at different times by the several different authors, in some cases independently and in others in collaboration.

Technique of Testing.

(a) *Contact Insecticides in liquid medium.* The ground dried plant material was extracted with alcohol and/or acetone and/or benzene and diluted with sulphonated loral solutions, 0·1% w/v to give concentrations in terms of part of plant of 5% and 1% w/v. The contact effect was determined by spraying in the Potter tower (Potter, 1941). The test subjects usually were adult apterous females of the two aphides *Macrosiphoniella* or *Macrosiphum solanifolii* and the saw-toothed grain beetle *Oryzaephilus surinamensis*, and they were held during the operation in 9 cm. petri dishes using a substratum of tricoline. After spraying and providing suitable food, the dishes were covered with muslin and stored in a cool cellar. The examination on a constant temperature warm plate took place after one or two days and the proportion of paralysed insects was determined.

(b) *Stomach poisons.*

Insect Test subjects.

Plutella maculipennis (last instar larvae)—Diamond back moth.

Diataraxia oleracea (1st instar larvae) —Tomato moth

Phaedon cochleariae (young adults) —Mustard beetle

Method of testing.

Turnip leaves were liberally painted on both sides with unfiltered extracts so that a fair amount of the powdered plant material was retained on the foliage.

The leaves were left to dry and then circles 1/2 in. in diameter were cut from them. The leaf circles were enclosed in cages with their tips resting in damp sand by means of which the circles were kept fresh until the end of the experiment.

For each plant extract six leaf circles were used and caged with the test insects as follows :—

(a) Three cages containing one leaf circle and four *Plutella maculipennis* larvae.

(b) Three cages containing one leaf circle and two adult *Phaedon cochleariae.*

(c) Untreated controls.

The technique with *Diataraxia oleracea* was as follows :—

Two small "January King" cabbage leaves were liberally painted with each of the plant extracts. When dry, each pair of leaves with the stalk in a small conical flask of water was enclosed in a hurricane lamp glass cage. One pair of untreated leaves was used as a control. 10–12 young last instar larvae of *D. oleracea* were placed in each cage.

All the experiments were carried out at laboratory temperature (55–65°F). It is clear that the combined effect of both contact and stomach poisoning is determined by these techniques ; this however would generally be so in the field.

Examination of insects.

The insects were examined on the following day and also after four days. Examination of the *P. maculipennis* and *P. cochleariae* was then concluded, but *D. oleracea* larvae, which were still alive, were enclosed with fresh untreated foliage and the examinations continued for a further eight days.

(c) *Powders.*

In view of the results obtained on the extracts it was decided to test a number of the plant materials as dry powders, a method apparently used by the Chinese with certain of their insecticides of vegetable origin, e.g. *Tripterygium wilfordii.* The larvae of *Plutella maculipennis*, a soft bodied insect, were chosen as test subjects.

The method used by one of us (R. I. S.) in the trials was as follows :— Circles of cabbage leaves were cut to fit exactly into 9 cm. spray dishes. After placing these in position the dusts were applied by shaking through a muslin bag on to the upper surface, so as to give an even and fairly heavy deposit over the whole area. Larvae of *Plutella maculipennis* were enclosed on the dusted surface ; they were examined the day after the treatment and at intervals during the following 2–3 weeks until death or normal pupation took place. The dishes were kept in a cool room. Fresh food was given when the original dusted leaf had withered, and was renewed as necessary.

British Plants.

The plants to be tested were selected chiefly upon grounds of tradition, often implied in their common names, such as Louseberry for *Eunonymus europaeus* and the several fleabanes*, but others were chosen for their botanical relationship to plants recognised to have insecticidal properties, others because they were either of known toxic properties or were alleged to be insecticidal.

Most of the plants which are listed in Table I were kindly supplied by the Royal Botanic Gardens at Kew, exceptions being Tomato and Broad Bean. The samples arrived at Rothamsted in an air-dried condition, except *Eranthis hyemalis* (Winter Aconite) which came as collected. The rhizomes and leaves of this plant were separated, washed free from soil and dried by us in a room at 30–35°C.

*These plants seem to have been used as remedies for the cure of Pediculi. References are given by McIndoo (1945) to what little information appears in literature.

Table I.

The following plants received from the Royal Botanic Gardens, Kew, on 9/12/42, were tested for their contact insecticidal properties.

Extracts were made with alcohol and/or acetone and/or benzene diluted with 0·1% sulphonated lorol solution at concentrations of 5% and 1% in terms of part of plant, on the aphides *Macrosiphoniella sanborni* (chrysanthemum aphis) and/or *Macrosiphum solanifolii* (potato aphis) ; and/or *Oryzaephilus surinamensis* (saw-toothed grain beetle).

Botanical Name	Common name	Part of Plant
Oenanthe crocata L. ...	Water Hemlock ...	roots
Euonymus europaeus L. ...	Spindle or Louse-berry tree ...	fruits
Pulicaria dysenterica (L.) Gaertn. ...	Fleabane ...	flower heads
Pulicaria dysenterica (L.) Gaertn.	Fleabane ...	stems and leaves
Erigeron acris L. ...	Blue Fleabane ...	plants
Erigeron acris L. ...	Blue Fleabane ...	flower heads
Erigeron canadensis L. ...	Canadian Fleabane	flower heads
Erigeron canadensis L. ...	Canadian Fleabane	stems and leaves
Inula conyza DC. ...	Fleawort ...	stems and leaves
Inula conyza DC. ...	Fleawort ...	flower heads
Tanacetum vulgare L. ...	Tansy ...	stems and leaves
Tanacetum vulgare L. ...	Tansy ...	flower heads
Chrysanthemum parthenium Bernh.	Feverfew ...	stems and leaves
Chrysanthemum parthenium Bernh.	Feverfew ...	flower heads
Anthemis cotula L. ...	Mayweed ...	plants
Matricaria matricarioides Porter	Rayless Camomile	plants and flower heads
Artemisia absinthium L. ...	Wormwood ...	whole plants
Eranthis hyemalis (L.) Salisb. rec. 18/4/42 ...	Winter aconite ...	rhizomes
Eranthis hyemalis (L.) Salisb.	Winter aconite ...	stems and leaves

Toxicity as extracts.

A summary of the results given by the plants listed in Table I, is as follows :—When tested as contact insecticides in the form of extracts in an aqueous medium on adult apterous viviparous parthenogenetic females of *Macrosiphoniella sanborni* and adult *Oryzaephilus surinamensis*, there may be a small measure of insecticidal activity shown by a number of them, sufficient to warrant their traditional common name, but only the fruits of Spindle gave evidence of insecticidal properties worth further investi-

gation. Some further laboratory work was therefore carried out with *Euonymus*, in which *O. surinamensis* and *Ahasverus advena* were employed as test subjects, and although the paralysing action of extracts of the spindle berries was confirmed, the concentrations were so high as to render it very doubtful whether any useful purpose would be served by large scale examination.

Tomato (*Lycopersicum esculentum*).

A common belief has been expressed that tomato foliage possesses an insecticidal action. Since tomato plants are produced in large quantities, a ready source of supply of raw material would be available, if this were true.

An ample summary of the work carried out on the insecticidal properties of the tomato plant has been given by McIndoo (1945). Many of the reports are rather vague statements of little critical value, and the comment of the reviewer seems amply warranted that "in view of all the good insecticides we now have, it seems a waste of time to continue investigations on the tomato plant."

Although Gimingham and Tattersfield (Priv. Comm.) had, in 1924*, tested alcoholic extracts of stem and leaves, using Bean Aphis (*Aphis fabae*) as test subject, and found very little, if any, toxic action at 5% w/v concentration, it was decided to repeat the experiment.

For this purpose two methods were used : (1) the ground air-dried material was extracted with acetone and tested as above, (2) macerated in a Waring Blendor with water containing 0·1% sulphonated lorol, filtered, and the contact effect tested at 33% w/v on *M. solanifolii* and O. *surinamensis*. The data are given in Table II. No results of a sufficiently marked insecticidal value were shown to warrant further work, except perhaps to ascertain whether there is an optimum time for collection.

*In addition to tomato ; Lobelia, Broom, Tansy, Camomile, Feverfew were tested in the same way on *Aphis fabae*. Some evidence was obtained that with alcoholic extracts of them all at high concentrations there was some insecticidal action, but it was not sufficiently noteworthy in any case to warrant extended investigation.

Table II.

Contact Insecticidal Tests with Tomato Plants.

Part of Plant	Description of Test	% pt. of plant	Result
Stem and leaf ...	Healthy plant, air-dried, acetone extract ...	5	No effect on *Macrosiphum solanifolii* and *Oryzaephilus surinamensis*
Root	Healthy plant, air-dried, acetone extract ...	5	No effect on *Macrosiphum solanifolii* and *Oryzaephilus surinamensis*
Stem	Plant with Tobacco mosaic ...	5	No effect on *Macrosiphum solanifolii* and *Oryzaephilus surinamensis*
Root	Plant with Tobacco mosaic	5	No effect on *Macrosiphum solanifolii* and *Oryzaephilus surinamensis*
Old stem ...	Healthy plant macerated with water ...	33	No effect on *Macrosiphum solanifolii* and *Oryzaephilus surinamensis*
Old leaf	Healthy plant macerated with water ...	33	No effect on *Macrosiphum solanifolii* and *Oryzaephilus surinamensis*
New leaf ...	Healthy plant macerated with water ...	33	No effect on *Macrosiphum solanifolii* and *Oryzaephilus surinamensis*

Tomato (stem and leaf), applied in pulverised form, was not toxic to *Plutella maculipennis* larvae (Diamond back moth).

Broad Beans.

Extracts of the air-dried roots and stems were tested for their contact effect in the usual way at concentrations of 10% ; a 35% kill of Bean aphis was obtained in the case of the roots, but the effect in the case of the stems was probably not significant. No effect was observed with *O. surinamensis*.

Toxic effect of plants used in powder form.

Further experiments on a number of these plants were carried out in which application was made in dry powder form by the technique already described. The powdered rhizome of *Eranthis hyemalis*† was found completely toxic to the larvae of *Plutella maculipennis*, and the flower heads of *Matricaria matricarioides* (=*M. suaveolens*) partially effective (33%). It is a matter of interest that Reingard and Zabud'ko Reingarde (1945) have shown the powdered dry flower of *Matricaria inodora* toxic to the fly *Musca autumnalis*. The remainder of the plants possessed little if any insecticidal properties when used in this way.

Tropical and Semi-tropical Plants.

Add-Add Root or Addad Root. This specimen was received in August 1943 through the agency of the Ministry of Supply ; it derived from Mazagan, Morocco. It was reported to us as *Atractulus gumifera*, probably in error for *Atractylis gumifera**, a thistle-like plant growing on rocky soil, with creeping roots some 50 cms. long by 1·5 cm. broad. It seems to be used somewhat widely as a "nostrum" for disabilities ranging from the "evil eye" to malaria, and the natives are reported to use it as an insecticide by burning it on red cinders.

A considerable amount of investigation of this plant has been carried out during the last 80 years. Lefranc (1868, 1873) isolated its active principle, a potassium salt of the tribasic atractylic acid. He stated that the naturally occurring salt is acidic and breaks down on hydrolysis to sulphuric acid, valerianic acid, a glucose and a resin. He isolated atractyline. Various formulae have been given for potassium atractylate ; Lefranc (1873) $C_{60}H_{54}S_2O_{36}$, Angelico (1906, 1923) $C_{30}H_{52}O_{18}S_2K_2$, Wunschendorff and Brandel (1931) $C_{25}H_{50}O_{18}S_2K_2$, Ajello (1933) $C_{30}H_{48}O_{18}S_2K_2$. Wunschendorff and Brandel (1931) give the melting point as 172° and $(\alpha)_D$ as — 64·39°. Angelico and Monforte (1923) isolated atractyligenin $C_{14}H_{12}O_4$ (colourless crystals melting at 168°) and atractyliretin isomeric with it, Ajello (1934) states the former to be a dihydroxy monocarboxylic acid, $(\alpha)_D 20°$ of — 143°. The active principle loses valeric acid at 160°, and gives a characteristic colour reaction when heated with sulphuric acid. Marras (1935) states that death to man results from other causes besides the hypoglycaemia physiologically characteristic.

Insecticide tests. An acetone extract of root at a concentration of 5% w/v had no contact effect on the willow aphis (*Pterochlorus saligna*). In experiments carried out at the same time, nicotine at 0·05% w/v gave 98% badly effected, moribund and dead, and DDT 80%. Rotenone gave 100% kill at 0·0025% w/v and 72% at 0·000125%, the pyrethrins 87–90% at 0·0009–0·0012% w/v. The extract had thus no marked contact insecticidal action on a relatively susceptible insect.

*We are indebted to the Director, Royal Botanic Gardens, Kew for literature references to this plant.

† It proved much less toxic when tested a year and a half later (August 1948).

The result of the stomach poison tests on aqueous and acetone extracts are given in Table III. There is neither toxicity nor repellency shown to *Plutella maculipennis*, but there is a very pronounced repellency to *Phaedon cochleariae*. It is partially toxic to *Diataraxia oleracea* as a stomach poison. No toxicity to *Plutella* larvae was shown by this plant when applied in powder form.

Table III.

Stomach-Poison Tests with Add-Add Root (*Atractylis gummifera*), and Sabadilla Seeds (*Schoenocaulon officinale*).

N=not affected, S=slightly affected, B=badly affected, M=moribund, D=dead

Treatments	*Plutella maculipennis*		
	Condition after 4 days.	Feeding applied as spray	Toxicity applied as powder
Add-Add root			
Acetone extract ...	12 N*	++++	Not toxic
Water extract ...	12 N*	++++	
Sabadilla alone			
Acetone extract ...	3S, 3B, 3M	+	Toxic 100%
Water extract ...	10 N	+++	
Sabadilla+Lime			
Acetone extract ...	6N, 4S, 1D	++	
Water extract ...	6N, 2S, 2B	++++	
Control	14 N	++++	

Treatments	*Phaedon cochleariae*	
	Condition after 4 days.	Extent of feeding
Add-Add root		
Acetone extract ...	6 N*	0
Water extract ...	6 N*	0
Sabadilla alone		
Acetone extract ...	2 S, 3 M, 1 D	+
Water extract ...	4 N, 2 S	+
Sabadilla+Lime		
Acetone extract ...	3 S, 3 B	++
Water extract ...	3 N, 2 S	++
Control	12 N	++++

*Condition two days after beginning of experiment.

Treatment Acetone extracts of :—	*Diataraxia oleracea.* Condition after 4 days	Extent of feeding	Condition after 12 days
Add-Add root ...	3 PrPN, 5N, 4B	++++	5PN, 2 PrPN, 4D
Sabadilla alone ...	2B, 5M, 4D	+	1 PN, 2 N, 8 D
Sabadilla+Lime ...	9 B, 3 M, 1D	++	4 PrPN, 1 N, 7 D
Control ...	1 PrPN, 11 N	++++	5 PN, 5 PrPN, 1 D

Extent of feeding is indicated as follows :—

0 —No feeding.
\+ —Nibbling.
++ —Slight feeding.
+++ —Half or more of food eaten.
++++ —All food consumed.
P denotes pupa.
PrP denotes prepupa.

Sabadilla (Cevadilla, cebadilla). This is derived from *Schoenocaulon officinale* A. Gray. The powder, extracts and ointments from the seed have been known for many years as an anti-parasiticide against lice. Allen, Dicke and Harris (1944) give an account of its insecticidal uses and describe a series of experiments upon the toxicity to houseflies of the extracts of the seeds and upon the most efficient means of preparing them. Fisher and Stanley (1945) have reported also on the insecticidal value of dusts prepared from the seed after alkaline treatment. Allen and co-workers (1945) have found sabadilla effective against a number of insect pests. The seeds of *S. officinale* contain a number of highly toxic alkaloids, and it has been shown by Allen, Link, Ikawa and Brunn (1945) that of them Cevadine is more toxic than Veratrine when applied as dust to the milk-weed bug (*Oncopeltus faciatus* Dallas) and the red-legged grasshopper (*Melanoplus femur-rubrum* De Geer). Ikawa *et al* (1945) have also tested the active principles against the house fly. Reviews of insecticide investigations carried out on sabadilla are given in the Bulletin of the Imperial Institute (R.M.J., 1946) and in "Soap" (1946).

The sample tested was received through Dr. C. B. Williams from Mr, A. R. Balfour of Lima, S. America, under the name of Babbini. reported (R. M. J., 1946) as a product which in Peru is comprised of Sabadilla, Chili pepper, arsenic and quicklime. It was in powdered form and thus precluded identification. Therefore, only a single series of tests with acetone extracts was carried out on *Aphis fabae* and on the adults of the beetle *Ahasverus advena* at concentrations of 5% and 1% in terms of the powder. To the aphid it was definitely insecticidal at the higher concentration but less so to *A. advena.*

The material supplied to us was completely toxic (100%) in powder form to the larvae of *Plutella maculipennis.*

The results of the stomach poions tests are given in Table III. From these results it is clear that the acetone extract of the sample of this preparation of Sabadilla has toxic properties to *P. maculipennis*, *P. cochleariae* and *D. oleracea*.

Thevetia peruviana (=*T. neriifolia*).

The kernels of the nuts of this plant, a tree of 10 - 20 feet high, have been known for some time to be poisonous to man. It is apparently native to South America but its cultivation has spread to the West and East Indies, W. Africa and the Hawaiian Islands. The kernels contain 57% of a pale yellow oil (De Vrij : 1881, Bhattacharya and Ayyar : 1927). In addition, De Vrij isolated from the defatted residues the glucoside " thevetin", a cardiac poison with a digitalis-like action which has been examined by Weitz and Boulay (1923), Chen and Chen (1934), Ghatak and Pendse (1933) Ghatak (1934), Arnold, Middleton and Chen (1935), Elderfield (1936), Tschesche (1936). It is a highly complex optically active substance, the constitution of which has not finally been determined. The ultimate analyses have given formulae of $C_{29}H_{46}0_{13}.2H_20$ melting at 193° $(\alpha)_D 23° = -62{\cdot}5°$ in methyl alcohol (Chen and Chen) ; $C_{29}H_{44}0_{13}$ sintering at 180°, decomposing 200-210° $(\alpha)_D$ 24° = $-60°$ in pyridine (Elderfield) ; $C_{42}H_{66}0_{18}0{\cdot}5H_20$—$C_{42}H_{66}0_{18}.3H_20$(Tschesche). A good deal of discrepancy is to be noted among the various results and it is clear that further work on this derivative is called for. Its toxicity to insects, if any, has not been determined. It is present to the extent of 0·5-0·6% (Lahiri *et al*, 1938).

The kernels soaked in water for 24 hours, filtered and applied with a small amount of soft soap, were found by Cherian and Ramachandran (1941) to be insecticidal to certain lepidopterous larvae, aphides and psyllids.

The sample we received consisted of whole nuts. They were sent us by the Royal Botanic Gardens at Kew but were derived from Irak through the agency of Major V. H. W. Dowson of Basra. As the greater part of the kernels had been reduced to a frass-like debris, only 16 grammes of sound kernel could be separated and only very preliminary tests attempted The shell, sound kernels and debris were separated, extracted with acetone and diluted in the usual way, but in addition an aqueous extract (containing 0·1% sulphonated lorol) was prepared and tested. In one series *Macrosiphum solanifolii*, adult *Oryzaephilus surinamensis* and the fully-grown larvae of *Plutella maculipennis* were sprayed and at a later date *Macrosiphoniella sanborni*.

Both extracts were diluted with 0·1% solution of sulphonated lorol. Only the tests at concentrations of 5% w/v in terms of part of plant are given in Table IV as no significant effect was noted below this.

Thus the kernels show some toxicity to the two species of aphid at the high concentration of 5% w/v in the case of both acetone and aqueous extracts, but no effect was produced on the other two test subjects. Tried out as stomach poison on the larvae of *Plutella maculipennis* no toxic action was observed.

Table IV.

Contact toxicity of *Thevetia peruviana* to a variety of insects.

Extract Part of Plant	% Concentration	Paralysed Insects % M. solanifolii	O. surinamensis	P. maculipennis	M. sanborni
Kernel (Acetone) ...	5	43	0	0	68
Shell (Acetone) ...	5	0	0	0	—
Debris (Acetone) ...	5	6.6	0	0	—
Kernel (Aqueous) ...	5	31	0	0	—
Shell (Aqueous) ...	5	0	0	0	—
Debris (Aqueous) ...	5	0	0	0	—

The conclusion can be drawn that the kernels might have some local use as an insecticide in districts where this plant occurs, but if this very inferior sample is representative, there is little prospect of any extensive general employment. In view of the toxic properties of some of its active principles, further work might be justified, but for this a larger and much better sample would be needed than we had at our disposal.

Randia dumetorum and *R. nilotica.* The late Dr. H. E. Durham of Cambridge drew our attention to a letter of S. V. C. Somanader in " Country Life " for Dec. 3rd, 1943, describing the use of *R. dumetorum* as a fish poison, apparently in Ceylon. It was considered on the analogy with certain leguminous fish poison plants that an insecticidal action might be shown. McIndoo (1945) quotes from one or two papers showing that experimental work of this kind on this plant has been carried out in India.

The fruits of *R. dumetorum* have been examined by Hardikar and Mohinddin (1937). They came to the conclusion that the principle responsible for any pharmacological effect was a weak saponin, of which it contained both a neutral and acid type. Subramanian (1933-4) reported that a 10% aqueous extract of the roots of *R. dumetorum* had given 80% mortality of the green scale. Roark and Keenan (1931) quote Dymock for its use in protecting grain against insect attack.

Through the kindness of the Director of Kew, samples of root, stem, leaves and fruit of this plant and the closely allied *R. nilotica* were obtained respectively from Ceylon and Nigeria. The botanical identity of the

material was confirmed. Two series of insecticide tests were made using acetone extracts, diluted with solutions of 0·1% sulphonated lorol in water to give concentrations of 5% and 1% in terms of part of plant. The insects used on the first occasion (27/7/44) were a wild stock of *Aphis fabae* and *Oryzaephilus surinamensis*, and on the second (3/10/44) *Aphis fabae* reared on nasturtium, and *Ahasverus advena*. (1) the kernel and shell of *R. dumetorum*, the bark and wood of *R. nilotica*, (2) the root, stem and leaves of *R. dumetorum* were tested. No appreciable contact toxic effect was observed.

When tested, however, on the larvae of *Plutella maculipennis* (Diamond back moth) by placing them on foliage dusted with the pulverised material the following results were obtained (for experimental technique see p. 331).

Randia dumetorum (roots)	50% kill
Randia nilotica (roots)	100% kill
Controls	13% kill

Preliminary Insecticidal Tests of Chinese Plants.

Seven small samples of plants were received on April 17th, 1944, from Professor Shin Foon Chiu through the British Council. They were submitted to the Director of the Royal Botanic Gardens at Kew, who, except in the case of *Tripterygium exesum*, which was in powder form, was able to confirm the identification. He expressed the view, however, that *T. exesum* is a *Tripterygium*, and is presumably meant for *T. wilfordii* var. *exesum* of Sprague and Takeda (Takeda, H., 1912, Kew Bull., p. 222). In addition, he reports as follows " With the larger amounts of material now available it is no longer possible to maintain the variety, see Bot. Mag. t. 9488. The original variety *exesum* was a Yunnan plant. The present material comes from Hunan, a specimen from that province was described as a distinct species *T. bullockii* Hance, but was long ago reduced to *T. wilfordii*—quite correctly." It was unfortunate in view of the results, that this material was sent us in powder form. It prevented the confirmation of its identity, and since the plant is reported to lose its toxicity rapidly, it is possible that such loss might be expedited by grinding.

For all the materials, laboratory techniques were used for determining the toxicity of extracts both as contact and stomach insecticides. For the former, two widely separated types of insects were used for preliminary trials, the bean aphis (*Aphis* (*Doralis*) *fabae*) and the saw-toothed grain beetle (*Oryzaephilus surinamensis*). Other insects employed were *Plutella maculipennis* the diamond back moth, and the relatively highly resistant aphis *Macrosiphum solanifolii* For stomach poison trials, *P. maculipennis* (fully grown larvae) were used.

The method of extraction is given in Table V. For preliminary work acetone was used as solvent. For plants showing promise this was followed up by an exhaustive extraction of the plant with ether, the resulting extracted resin being taken up in acetone and appropriate dilutions made with an aqueous solution (=0·1%) of sulphonated lorol.

Table V.

Chinese Insecticidal Plants as Contact Poisons.

All tests, unless otherwise stated, were made using extracts prepared and diluted as follows :—5 gms. of the powdered plant material were allowed to stand overnight with 25 ml. of acetone, the solids were filtered off to give a clear 20% acetone extract. This extract was diluted with 0·1% sulphonated lorol solution. The results of the trials by contact are given as percentages of deeply paralysed insects (50 being used for each test).

	Aphis (Doralis) fabae (wild colony) apterous viviparous females		*Oryzaephilus surinamensis* adults
Plant Name Locality	Concentration % w/v	% deeply paralysed insects corrected for controls.	% deeply paralysed insects corrected for controls.
Rhododendron molle G. Don. *Flowers*	5	9	0
Locality : Ichang, Hunan Province, China ...	1	30	0
Date : April 1943. Coll. H. F. Yen Control	—	(10%)	(21%)
Rhododendron molle G. Don. *Root*	5	13	0
Locality: Hingon, Kwangsi Province, China ...	1	13	0
Date : October 1940. Coll. C. H. Chiu and S. Lin. Control	—	(10%)	(21%)
Milletia pachycarpa Benth. *Root*	5	100	87
Locality:Liuchow, Kwangsi Province, China ...	1	100	41
Date : October 1940. Coll. T. H. Lin. Control	—	(10%)	(21%)
Milletia pachycarpa Benth. *Seed*	5	100	100
Locality : Ichang, Hunan Province, China ...	1	100	100
Date : Winter 1943. Coll. S. F. Chiu and S. Lin. Control		(5%)	(8%)

Plant Name Locality	*Aphis (Doralis) fabae* (wild colony) apterous viviparous females		*Oryzaephilus surinamensis* adults
	Concentration % w/v	% deeply paralysed insects corrected for controls	% deeply paralysed insects corrected for controls.
Tripterygium wilfordii. Root bark powder	5	0	18
Locality : Ichang, Hunan Province, China ...	1	0	35
Date : Winter 1943. Coll. S. F. Chiu and S. Lin. Control	—	(5%)	(5%)
Derris fordii. Oliv. *Root* ...	5	100	60
Locality : Ichang, Hunan Province, China ...	1	100	13
Date : February 1942. Coll. S. Lin and H. F. Yen. Control	—	(10%)	(21%)

Milletia pachycarpa was also tested on the more resistant aphis *Macrosiphum solanifolii*, both root and seed were extracted in a soxhlet with ether, the solvent removed and the residue dissolved in acetone. The solutions were made up with 0·1% sulphonated lorol in water. The roots, although completely toxic at 2·0%, were less potent than the seed which gave a kill of 93% at a concentration of 0·3%.

Derris fordii root was less toxic to this insect than either root or seed of *M. pachycarpa*.

Extracts of none of this series of plants showed any material toxicity to the larvae of *Plutella maculipennis* either by contact or by ingestion when tested as sprays. The results obtained by the application in powder form to this insect are given in Tables VI and VII

The Durham colour test for rotenoids gave a strong reaction with the seed of *M. pachycarpa* but a weak one for the root of *M. pachycarpa* and *D. fordii*.

Rhododendron molle. Neither flowers nor roots showed any material insecticidal action as extracts (Table V). There is an anomalous result with bean aphis in the case of the flowers, 30% being seriously affected at 1% against 9% for 5% but this might easily be accounted for by the wide variation in the susceptibility of a wild colony, due to parasitism. The root is very slightly toxic to the larvae of *Plutella maculipennis* as a stomach poison. The leaves and root of this plant were tested by Lee and Hansberry (1943) against silkworm, bean beetle and bean aphid and, although some toxicity was shown to the bean beetle, extracts were without effect on the other two species.

This plant does not show in our tests on its extracts any general promise as an insecticide, either as a contact or stomach poison. The flowers, however, when applied in powder form were somewhat toxic to *Plutella maculipennis*.

Milletia pachycarpa. This plant belongs to the class of leguminous fish poisons, as do Derris and various species of *Lonchocarpus*. A number of species of this genus have been tested as insecticides, references to the literature being made by Tattersfield, Martin and Howes (1940), who also reported on their tests as contact insecticides of extracts of the root of *M. pachycarpa* from India. Lee and Hansberry (1934) carried out a number of insecticide trials using root, stem, seed and seed pods from China. Extracts of the root and seed proved decidedly effective to their test subjects (silkworm, bean beetle and bean aphid). Needham (1946) reports that *M. pachycarpa* had been found by Dr. Chao Shan-Huan as good as derris against a variety of insects.

The seed and root have obviously a considerable potency as a contact insecticide, the seed being rather more effective than the root. The Durham tests for rotenoids gave a strong reaction in the case of the seed. Tested against pure rotenone, the seed showed approximately 1/250th of its potency. It is much less powerful, therefore, than the more recently isolated strains of *Derris elliptica* or *Lonchocarpus utilis*. As, however, the seed is more toxic than the root and would be more readily harvested, a relatively strong case could be made out for a continued study of this plant, particularly from the point of view of plant selection for higher potency. At present it could only be recommended for local use. There was no activity shown by an extract as a stomach poison to the last instar of the larvae of *Plutella maculipennis*, but it showed definite repellency. To this insect the powdered seed had a high toxicity (100%) but the root had little toxic action when applied in powder form (Table VII).

Derris fordii. Extracts of the root proved insecticidal by contact (Table V), but unless this species can be improved very greatly by selection its usefulness would be limited to the locality in which it is grown. Modern selections of *Derris elliptica* are much more potent. It gives a faint colour in the Durham test for rotenoids. There is little or no toxicity as a stomach poison to the last instar larvae of *Plutella maculipennis.*

Tripterygium wilfordii. Root bark powder. According to H. H. Shepard (1939) *T. wilfordii* is the most commonly used insecticide in South China, and this would appear to be amply borne out by the number of references to its insecticidal use in Chinese literature given in the review of this insecticide by W. T. Swingle and his co-workers (1941). The root bark appears to contain the highest concentration of the active principle. It is used in China as a powder, and as such in a freshly prepared sample from recently harvested roots is reported to be toxic to the 1st. instar larvae of *Plutella maculipennis* by Swingle *et al* (1941). Alcoholic extracts of the fresh roots were also found toxic to codling moth larvae. Needham (1946) also speaks highly of its insecticidal properties as shown by Chinese workers. Cheng (1945) has noted the effectiveness of *T. forestii* (=*T. wilfordii*) root against the Melon beetle, and Lee and Hansberry (1943), although finding little or no toxic action on silkworm and bean aphis, showed the dust to be toxic to the bean beetle.

The results obtained by us (Table V) using extracts, were somewhat uncertain. Apparently there was no contact effect with either *Aphis fabae* or *P. maculipennis*, but there is an irregular action in the case of *Oryzaephilus surinamensis*. As the extract is more toxic at 1% than 5% concentration, there may possibly have been an irregular adsorption

through the mouthparts leading to this anomalous result. There was no stomach poison effect on fully grown larvae of *Plutella* although a slight repellency was shown.

In view of reports (Science, 1941, **93,** Jan. 17, p. 60) about the loss of activity that this plant shows on exposure, we requested the Royal Botanic Gardens at Kew to supply us with fesh material, if it were available. They were able to do so. Extracts of the undried leaves and stems showed a slight, but not complete (i.e. 100%) contact toxicity to the bean aphis (*Aphis fabae*). The results given by the root extract were of the same type as the material derived from China ; there was a toxic effect of the order of 50-60% paralysed insects with 10% extracts (in terms of fresh undried root) in the case of *Oryzaephilus surinamensis*, but little or no action on bean aphis at this concentration and no toxicity as a stomach poison to the last instar of the larvae of *Plutella maculipennis*.

It is clear that extracts of this plant would have little or no use as a contact insecticide in competition in western markets with the products of *Derris* spp., *Lonchocarpus* spp., or modern synthetic insecticides. It, however, does present problems which are worth further examination, namely, whether its effect is specific to certain insects and whether earlier larval instars are much more susceptible than later ones to its toxic action. In addition, the rate of loss of toxic action on exposure, its cause and whether it can be remedied, might be worth examination.

Trials with the finely ground powder of this material were also carried out ; as the treatments, however, differed slightly from those used in similar trials on other plants, they are described separately and more fully.

Test insects and treatments.

(A) Dusts applied direct to larvae on leaf surface
2 dishes :— (1) 10, 4th instar larvae
(2) 10, 2nd, 3rd, instar larvae

(B) Insects placed on leaf surface after dusting
2 dishes :— (1) 10, 4th instar larvae
(2) 10, 2nd, 3rd instar larvae

(C) Untreated controls
2 dishes :— (1) 10, 4th instar larvae
(2) 10, 2nd, 3rd instar larvae

The following table shows *Trypterygium* in powder form to be appreciably toxic to both mature and young larvae of *P. maculipennis*.

Table VI.

Treatment	No. dead	No. pupating normally	% kill
A1 ...	7	3	70
A2 ...	8	2	80
B1 ...	9	1	90
B2 ...	10	—	100
C1 ...	—	9 (1 missing)	0
C2 ...	—	10	0

Other plant materials tested as powders.

As it was thought that other plant materials might be more potent insecticidally when used in dried ground form, than after chemical extraction, further preliminary trials were carried out.

Test insects and treatments.

Immature larvae of *P. maculipennis* (2nd–3rd instar) were used. The materials were tested in batches as the insects became available, separate controls being used on each occasion.

Each treatment consisted of 3 replicas (i.e. 3 dishes each containing 10 larvae). The larvae were placed on the leaf circles after the dusts had been applied. The results for the Chinese plants tested are summarised in Table VI or VII; those of others are given above (p. 340 and Table III) Although expressed numerically no claim for exact assessment is made ; the data do, however, enable one to separate the less from the more toxic plants.

Table VII.

The toxicity of certain Chinese plants applied in powder form to the larvae of Plutella maculipennis.

Name and Reference No.	No. larvae used	No. dead	No pupating normally	No. Missing	% kill
Milletia pachycarpa Seeds (Y 44) ...	28	28	—	—	100
Milletia pachycarpa root (Y 46)	30	5	22	3	18
Rhododendron molle Flowers (Y 45) ...	30	18	12		60
Rhododendron molle ... Root (Y 51) ...	30	4	24	2	14
Derris fordii Root (Y 50)	30	23	3	4	88
Controls (not dusted)	30	4			13
Controls	30	2	27	1	7

General Conclusions.

The main practical conclusions drawn from these experiments are :—

(1) That in the face of the high potency, not only of certain modern synthetic insecticides, but of such plant products as recent strains of Derris and Lonchocarpus roots and Pyrethrum flowers, there is little chance of most of the plants examined, which showed definite insecticidal properties, having more than a local market unless much attention were given to their improvement by selection. This indeed might be worth consideration in the case of plants where the aerial parts, stem, leaf, fruit (e.g. *Milletia pachycarpa*) have shown some insecticidal power, since their harvesting would be easier than roots and less likely to cause soil erosion.

(2) It is clear that some plants show a selective toxicity in that some insects are more susceptible to their toxic effects than others. It is impossible within a limited time to examine products of these types over so wide a range of insect test-subjects as would rule out the possibility of failure to discover such specific effects. All that is feasible is to cover a certain number of different species of test-subjects, showing a range of susceptibility to such well known and largely used plant materials as derris, pyrethrum and nicotine, and to subject them to the effects of the plants under examination either as contact or stomach poisons or as the two combined. More detailed work can then be concentrated on those showing the greatest potency.

(3) The importance of the technique used for application is the outstanding fact which has emerged from this work. When tested as fine powders a certain number of plants of quite different natural orders have proved to have a measure of insecticidal potency, whereas, when used as extracts prepared by the use of water, alcohol, acetone etc., as solvents, they had little or no effect. It apparently was the custom of the horticulturalists of China in the case of *Tripterygium* sp. to employ the finely ground powder. In our tests a number of plants, including *Tripterygium wilfordii* have demonstrated a relatively high insecticidal power when employed in this way against *Plutella maculipennis*, whereas their extracts have apparently been devoid of activity or at least have proved so feeble in effect as to warrant the conclusion that they would be useless as insecticides. It is not improbable that the popular names ascribed to many of the British plants were gained from their use as dry powders. No explanation at the moment can be given for the discrepancy but obviously there is a field here for further investigation.

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References

General.

McIndoo, N. E. (1945). Plants of Possible Insecticidal Value. (A review of the literature up to 1941). U.S. Dept. Agric., Bur. Ent. & Plant Quar., E-661.

Potter, C. (1941). A Laboratory Spraying Apparatus and Technique for Investigating the Action of Contact Insecticides. Ann. Appl. Biol., **28**, No. 3, p. 142.

Roark, R. C. and Keenan, G. L. (1931). Plants Reputed to have Insecticidal Value. Plants found in India. U.S. Dept. Agric., Bur. Chem. & Soils, Food & Drug Administration (Mimeograph).

Reingard, L. V. and Zabud'ko-Reingarde (1945). The Common Mayweed (*Matricaria inodora*) as a Good but Little Studied Insecticide. Med. Parasitol. No. 3, 92. Rev. Appl. Ent. (1946), **34,** B, Pt. 12, 208.

Add-Add Root. Atractylis gummifera.

Angelico, F. (1906, 1910). Principles of *Atractylis gummifera* (Sicilian Masticogna).
Gazetta **36,** ii, 636. (J. Chem. Soc., (1907), A II, **92,** 122).
Gazetta **40,** i, 403. (J. Chem. Soc., (1910), A I, **98,** 403).

Angelico, F. and Montforte, F. (1923). Scission of Potassium Atractylate. Ibid **53,** 808. (J. Chem. Soc., (1924), **126,** A I, 195).

Ajello, T. (1933, 1934). Active Principle of *Atractylis gummifera.* Gazetta **63,** 99. (Brit. Chem. Absts., (1933), A, 612).
ibid **64,** 59, 938 (Brit. Chem. Absts. (1934), A, 538)
(1935), A, 495).

LeFranc—(1868, 1873). Sur l'acide atractylique et les atractylates produits immediate extraits de la racine de l'*Atractylis gummifera.* Compt. Rend. **67,** 954 and **76,** 438.

Marras, A. (1935). Therapy of Poisoning by the Active Principle (Potassium Atractylate) of *Carlina gummifera.* Bull. Soc. ital. Biol. sperim. **10,** 357. (Brit. Chem. Absts., (1936), A, 240).

Wunschendorff, H. and Brandel, P. (1931). Potassium Atractylate. Bull. Soc. Chim, Biol., 1931, **13,** 758, 764. (Brit. Chem. Absts., (1931), A, 1341).

Wunschendorff, M. E. (1919). La Racine d'*Atractylis gummifera.* Jour. Pharm, et Chim, **20,** 318. Bot. Absts., (1920), 5, (1), 114.

Randia spp.

Hardikar, S. W. and Mohinddin, M.G. (1937). Chemical and Pharmacological Examination of *Randia dumetorum.* N. O. Rabiaceae. Ind. Jour. Med. Res., **25,** 131. (Brit. Chem. Absts., (1938), A III, 609).

Somanader, S. V. O. (1943). Ingenious Fly-traps. Country Life, **94,** No. 2446 (Dec. 3rd), 1001.

Subramanian, T. V. (1933–4). Report of Entomological Section 1933-4. Mysore Dept. Agric, Ann. Admin, Rep. p. 23. (Brit. Chem. Absts., (1937), B, 603).

Sabadilla.

Allen, T. C., Dicke, R. J. and Harris, H. H. (1944). Sabadilla, *Schoenocaulon spp*, with Reference to its Toxicity to Houseflies. Journ. Econ. Ent., **37,** No. 3, 400.

Allen. T. C. and Brunn, L. K. (1945). Increased Toxicity of Lime-Treated Sabadilla Seed in Dust Suspensions. J. Econ. Ent., **38,** No. 3, 291.

Allen, T. C., Link, K. P., Ikawa, M. and Brunn, L. K. (1945). The Relative Effectiveness of the Principal Alkaloids of Sabadilla Seed. J. Econ. Ent., **38,** No. 3, 293.

Fisher, E. H. and Stanley, W. W. (1945). Preliminary Tests with Sabadilla. Jour. Econ. Ent., **38,** No. 1, 125.

Ikawa, M., Dicke, R. J., Allen, T. C. and Link, K. P. (1945). The Principal Alkaloids of Sabadilla Seed (*Schoenocaulon* sp.) and Their Toxicity in Kerosene to *Musca domestica.* Jour. Biol. Chem., **159** (2), 517. (Biol. Absts., 1946, **20,** No. 5, 9179).

J., R. M. (1946). Sabadilla as an Insecticide (a review). Bull. Imp. Inst., **44,** 102.

Anon. (1946). Sabadilla Insecticide Development (a review). Soap, **22,** No. 9, 135.

Thevetia peruviana (Pers.) Merrill (= *T. neriifolia* Juss. ex Steud.).

Arnold, H. L., Middleton, W. S., Chen, K. K. (1935). The Action of Thevetin, a Cardiac Glucoside. Amer. J. Med. Sci., **189,** 193. (Brit. Chem. Absts., (1936) A, 375).

Bhattacharya, R. and Ayyar. P. R. (1927). Oil from the Seeds of *Thevetia neriifolia.* Jour. Ind. Inst. Sci., **10** A, 15. (Brit. Chem. Absts., (1927), B, 706).

Chen, K. K. and Chen, A. L. (1934). Constituents of Be-still Nuts *Thevetia neriifolia.* Jour. Biol. Chem., **105,** 231.

Cherian, M. C. and Ramachandran, S. (1941). Kernels of *Thevetia neriifolia* Juss.—as a potent Insecticide. Curr. Sci., 10, No. 9, 412 (Rev. App. Ent. (1942) **30** A, pt. 6, 303).

Elderfield, R. C. (1936) Thevetin. Jour. Biol. Chem., **115,** 247.

Ghatak, N. (1934). Thevetin, the Crystalline Glucoside of *Thevetia neriifolia* Juss. Proc. Acad. Sci., U.P. India **4,** 173. (Brit. Chem. Absts., (1935) 775, 1110).

Ghatak, N. and Pendse, G. P. (1933). Chemistry of the Roots of *Thevetia neriifolia* Juss. Bull, Acad, Sci., U.P. Allahabad, **2,** 259. (Brit. Chem, Absts., (1933) A, 877).

Lahirii, J. K., Ghosh, A. and Chopra, R. N. (1938). Preparation of Pure Thevetin from the Seeds of *Thevetia neriifolia* Juss. Arch. Pharm. **276,** 345. (Brit. Chem. Absts., (1938), A III, 773).

Tschesche, R. (1936). Vegetable Heart Poisons. XI. Constitution Of Thevetin. Ber. **69** [B], 2368.

de Vrij, J. E. (1881). *Thevetia neriifolia.* Pharm. Jour. Trans. [3], **12,** 457. Jour. Chem. Soc., (1882), Aii, 328.

Warden, C. I. H. (1881). Blue Colouring Principle of *Thevetia neriifolia*. Pharm. Jour. Trans., [3], **12,** 417. (Jour. Chem, Soc., (1882), A ii, 308).

Warden, C. J. A. Presence of a Second Poison Principle in *Thevetia neriifolia*. Pharm. Jour. Trans. [3], **13,** 42. Jour. Chem. Soc., (1882), A ii, 1126.

Weitz, R. and Boulay, A. (1923). *Thevetia neriifolia* Juss. Bull. Sci. Pharm. **30,** 81. Jour. Chem. Soc., (1923) **124,** A i, 1023.

Chinese Plants.

Miscellaneous.

Lee, C. S. and Hansberry, R. (1943). Toxicity Studies of Some Chinese Plants. Jour. Econ. Ent., **36** (6) 915.

Needham, J. (1946). Science and Technology in China's Far East. Nature, **157,** No. 3981, 175.

Shin-Foon Chiu, Sping Lin and Ching-Yung Hu (1946). Toxicity Studies of Insecticidal Plants in Southwestern China. Rep. Coll. Agric. Nat., Sun Yat Sen Univ., Canton (1946). Amer. Chem. Absts. (1947), **41,** No. 7, 2201-2202.

Milletia pachycarpa.

Tattersfield, F., Martin, J. T. and Howes, F. N. (1940). Some Fish Poison Plants and Their Insecticidal Properties. Kew Bull. (1940), 169.

Tripterygium wilfordii

Cheng, T. H. (1945). Field Tests of the Thunder God Vine against Melon Leaf Beetle. Jour. Econ. Ent., **38,** No. 4, 49.

Shepard, H. H. (1939). Chemistry and Toxicology of Insecticides, p. 300. Burgess Publ. Co., Minneapolis.

Swingle, W. T., Haller, H. L., Siegler, E. H. and Swingle, M. C. (1941). Chinese Insecticidal Plant *Tripterygium wilfordii* Introduced into the United States. Science, **93,** Jan. 17, No. 2403, 60.

SOME NEW SPECIES OF PAVETTA L. FROM TROPICAL AFRICA.

C. E. B. Bremekamp.

177 b.* **Pavetta pammalaka** *Brem.* n. spec. ad sectionem *Aethiopiaymphen* pertinens, maxime ut 177 a. *P. venenata* Hutch. et E. A. Bruce (in Kew Bull. 1941, 149) sed foliis siccitate rubro-brunneis, numero paulo majore nervorum et acarodomatiis valde conspicuis instructis, floribus numerosioribus sed minoribus ab ea recedens; typus: Glover & Gilliland 944 in herbario amaniensi.

Frutex circiter 1·8 m. altus. *Rami* novelli dense puberuli, vetustiores cortice eburneo nitidulo fissurato vestiti. *Folia* sessilia sed basin versus in pseudo-petiolum usque ad 0·6 cm. longum contracta, lanceolata vee lineari-lanceolata, plerumque 5–8·5 cm. longa et 1–2·2 cm. lata, apice subacuta et calloso-mucronata, margine recurvata, siccitate rubro-brunneis, supra primum densius puberula, deinde plus minusve glabrescentia, subtus dense sed brevissime tomentella, costa subtus prominula, nervis utroque latere costae 5–10, siccitate subtus colore saturatiore conspicuis, domatiis in axillis nervorum conspicuis. *Stipulae* in vaginam scariosam 1 mm. altam dense puberulam utroque latere arista 3 mm. longa coronatam connatae, intus axilla pilis paucis sericeis instructae sed ceterum glabrae. *Inflorescentiae* ramulos laterales terminantes, dense puberulae, floribus circ. 60. *Ovarium* subglobosum, dense puberulum, 1 mm. altum. *Calyx* dense puberulus, 1 mm. altus, lobis triangularibus tubo subaequilongis. *Corolla* alba, extus glabra, tubo 9–12 mm. longo et 0·9 mm. diametro, intus apicem versus piloso, lobis 6 mm. longis et 1·2 mm. latis, intus ad basin pilosis. *Stylus* 2·8 cm. longus.

Somaliland. N.W. face of Sarud Ad, *Glover & Gilliland* 944 (Kew & Amani Herb.), "White-flowered shrub of 6 ft. in a kloof", 10 July 1945.

Hutchinson and Bruce compared their *P. venenata* with *P. subcana* Hiern, but because of the position of the inflorescences at the end of ordinary green shoots it is to be referred to the section *Aethiopiaymphe*, where it comes nearest to the new species described above and to *P. linearifolia* Brem., a species collected in Zanzibar.

205 b. **Pavetta corethrogyne** *Brem.* n. spec. ad sectionem *Trichosphaeram* pertinens, a speciebus aliis huius sectionis foliis breviter petiolatis parvis, corollae tubo brevi et lobis ellipticis distinguenda; typus: Zimmermann 1771 in herbario amaniensi.

Frutex indumento griseo-brunneo vestitus. *Rami* vetustiores cortice brunneo opaco vestiti. *Folia* petiolo 1·5–2·5 mm. longo instructa; lamina oblonga vel obovata, 3·5–6·5 cm. longa et 1·5–2·5 cm. lata, apice acuminata, basi acuta, herbacea, siccitate nigrescens, utrimque opaca, supra primum dense, deinde sparse pubescens, subtus primum tomentella costa nervisque tomentosis, deinde dense pubescens, costa subtus prominente, nervis utroque latere costae 6–7, nodulis praesertim ad costam adjacentibus. *Stipulae* late triangulares, in aristam usque ad 4 mm.

* The numbers are those used in my monograph for the species in whose vicinity the new ones will have to find a place.

longam exeuntes. *Rami florigeri* ex internodiis duobus compositi ; internodium inferius 3–3·5 cm. longum, superius 0·8–1·1 cm. longum. *Inflorescentia* corymbosa, dense pubescens, floribus 20–25. *Calyx* lobis 5–6 mm. longis. *Corolla* extus sparse pubescens, tubo 8·5 mm. longo, intus sparse piloso, lobis 8·5 mm. longis et 3·5 mm. latis, obtusis. *Stylus* 2·5 cm. longus.

Tanganyika Territory. Eastern Usambaras : Mtai, *Zimmermann* 1771 (Amani Herb.), Febr. 1908.

The corolla of 205 a. *P. fluvistipulata* Brem., of which I had as yet not seen open flowers, appears to be 17 mm. long ; the linear lobes are 8·5 mm. long and 1 mm. wide, and the style is 4·2 cm. (*Koritschoner* 1334 in Amani Herb.).

224 a. **Pavetta gillmani** *Brem.* n. spec. ad sectionem *Dolichosiphonem*, seriem *Dentatarum* pertinens ; inter species glabras vel subglabras calycis dentibus satis longis ad *P. erlangeri* Brem. accedens, foliis angustioribus, nervis paucioribus instructis, calycis dentibus hirsuto-ciliatis, corolla breviore ad ea faciliter distinguenda ; typus : Gillman 126 in herbario amaniensi.

Frutex. *Rami* novelli glabri ; vetustiores cortice griseo-brunneo vestiti. *Folia* petiolo glabro 7–15 mm. longo instructa ; lamina lanceolata, plerumque 11–15·5 cm. longa et 3–6 cm. lata, apice acuminata, basi acuta vel contracta, herbacea, siccitate olivacea, utrimque glabra, nodulis parvis, costa subtus prominula, nervis utroque latere costae 7–8. *Stipulae* extus hirsutae, in vaginam 2·5 mm. altam utroque latere arista 1·8 mm. longa coronatam connatae, intus sericeo-villosae. *Rami florigeri* apice jugis duobus foliorum ceteris dimidio brevioribus coronati. *Inflorescentia* contracta, floribus circiter 20, bracteis hirsuto-ciliatis ; pedicelli 1·5–2 mm. longi, subglabri. *Ovarium* pilis paucis sparsum. *Calyx* tubo 1 mm. alto, dentibus hirsuto-ciliatis 4 mm. longis. *Corolla* extus glabra, tubo 15 mm. longo et 1 mm. diametro intus piloso, lobis linearibus 5·5 mm. longis et 1·5 mm. latis apiculatis. *Stylus* 4 cm. longus.

Tanganyika Territory. Bukoba District. Buyango Forest, *Gillman* 126 (Kew & Amani Herb.), 15 Sept. 1934.

224 b. **Pavetta gloveri** *Brem.* n. spec. ad sectionem *Dolichosiphonem*, seriem *Dentatarum* pertinens ; inter species glabras vel subglabras calycis dentibus satis longis ad *P. erlangeri* Brem. et *P. gillmani* Brem. accedens, foliis numero minore nervorum instructis necnon calycis dentibus hirsutis a specie priore, a *P. gillmani* foliis brevius petiolatis, stipulis longius vaginatis haud distincte aristatis distinguenda ; typus : Glover & Gilliland 473 in herbario kewensi.

Frutex circiter 3·5 m. altus. *Rami* novelli ad nodos hirsuti, ceterum glabri ; vetustiores cortice albido vestiti. *Folia* petiolo marginibus ciliato, 2–3 mm. longo instructa ; lamina oblonga vel elliptica, plerumque 6–10 cm. longa et 2·5–4 cm. lata, apice acuminata et calloso-mucronata, basi acuta, coriacea, siccitate olivacea, supra glabra et nitida, subtus costa nervisque pilis satis longis sparsa, nodulis parvis, costa subtus prominente, nervis utroque latere costae 7–8. *Stipulae* in vaginam circiter 6 mm. altam utroque latere cuspidatam connatae, extra basin et medio

hirsutae sed alibi glabrae, axilla sericeo-villosae. *Rami floriferi* 2·5–5 cm. longi, duobus vel tribus jugis foliorum magnitudine redactorum plerumque mox deciduorum coronati. *Inflorescentia* subcontracta, floribus 20–30, ramulis pedicellisque glabris. *Ovarium* pilis aliquibus sparsum. *Calyx* tubo subnullo, dentibus e basi triangulari filiformibus 5 mm. longis sparse hirsutis. *Corolla* extra glabra, tubo 20 mm. longo et 1·5 mm. diametro intus parce piloso, lobis oblongis 6·5 mm. longis et 2·5 mm. latis apiculatis. *Stylus* 3 cm. longus.

Somaliland. Tausaiver—Berde, *Glover & Gilliland* 473 (Kew Herb.), 28 Dec. 1944.

224 c. **Pavetta gillilandii** *Brem.* n. spec. ad sectionem *Dolichosiphonem*, seriem *Dentatarum* pertinens ; inter species glabras vel subglabras calycis dentibus satis longis ad *P. erlangeri*, *P. gillmani* et *P. gloveri* accedens, inflorescentia dense pubescente ab iis facile distinguenda ; typus : Glover & Gilliland 1201 in herbario kewensi.

Frutex. *Rami* novelli ad nodos hirsuti, ceterum glabri ; vetustiores cortice griseo vestiti. *Folia* petiolo marginibus ciliolato 2–7 mm. longo instructa ; lamina elliptica, plerumque 6–10 cm. longa et 2·5–5 cm. lata, apice acuminata et calloso-mucronata, basi acuta, coriacea, siccitate olivacea, supra nitida, utrimque glabra, nodulis parvis, costa subtus prominente nervis utroque latere costae 7–9. *Stipulae* in vaginam 6–8 mm. longam, utroque latere cuspidatam connatae, extra basin versus pubescentes, axilla sericeo-villosae. *Rami floriferi* ex internodio uno vel e duobus compositi, basin versus cortice secundario vestiti, uno jugo foliorum magnitudine paulo redactorum coronati. *Inflorescentia* subcontracta, floribus circiter 15, pedunculo, ramulis, pedicellis dense pubescentibus. *Ovarium* basi sparse, apicem versus dense pubescens. *Calyx* tubo subnullo, dentibus e basi triangulari filiformibus 4·5 mm. longis, basin versus pubescentibus, margine ciliatis. *Corolla* extra glabra, tubo 25 mm. longo et 1·2 mm. diametro intus parce piloso, lobis ovato-lanceolatis 7 mm. longis et 2 mm. latis acutis et calloso-mucronatis. *Stylus* 4 cm. longus.

Somaliland. Golis Range, Gan Libah, Kabonleh, alt. 1600 m., *Glover & Gilliland* 1201 (Kew Herb.).

This species and the preceding one are doubtless nearly related to *P. erlangeri* Brem., which they resemble not only in the great length of the calyx teeth but also in the cuspidate, almost entirely connate stipules. The stipules of *P. gillmani* Brem. are provided with a shorter sheath and with a fairly long awn.

225 a. **Pavetta spaniotricha** *Brem.* n. spec. ad sectionem *Dolichosiphonem*, seriem *Dentatarum* pertinens ; inter species glabras vel subglabras ad *P. abysicicam* Fresen. accedens, sed foliis sub-sessilibus multo minoribus, floribus minoribus ab ea distinguenda ; typus : Davies 889 in herbario amaniensi.

Frutex. *Rami* novelli glabri ; vetustiores cortice cinereo opaco vestiti. *Folia* subsessilia ; petiolus interdum ad 2 mm. longus ; lamina plerumque obovata vel lanceolata, 4–5 cm. longa et 1·5–2·5 cm. lata, apice acuta vel breviter acuminata, basin versus attenuata, in petiolum brevem tamen haud raro subito contracta, herbacea, siccitate nigrescens, supra costa

sola sparse hirsuta, subtus costa nervisque sparse hursuta, inter nervos sparsissime hirsuta, costa subtus prominente, nervis utroque latere costae 7–10, nodulis pluribus sparsis. *Stipulae* extus glabrae, in vaginam 5 mm. altam utroque latere apiculatam connatae. *Rami floriferi* ad apicem jugis foliorum duobus vel tribus instructi ; ubi tria juga adsunt inferius ab aliis paulo remotum. *Inflorescentia* subcontracta ; pedicelli 1·5–3 mm. longi, glabri. *Ovarium* glabrum. *Calyx* 2·5 mm. altus, tubo subglabro 1·5 mm. alto, dentibus hirsuto-ciliatis 1 mm. longis. *Corolla* extus glabra, tubo 11 mm. longo et 1·3 mm. diametro intus densius piloso, lobis 5 mm. longis et 1·5 mm. latis acutis. *Stylus* 2·5 cm. longus.

Tanganyika Territory. Rungwe District. Undalis, alt. 1650 m., *Davies* 889 (Kew & Amani Herb.), " shrubby, common", 27 Febr. 1932.

This species looks very much like *P. kyimbilensis* Brem., from which however it differs by the greater length of the calyx teeth. For this reason it is referred to the series *Dentatae*.

232 a. **Pavetta denudata** *Brem.* n. spec. ad sectionem *Dolichosiphonem*, seriem *Dentatarum* pertinens ; *P. oliverianae* similior sed foliis subglabris angustioribus apice acuminatis basi acutis numero majore nervorum instructis ab ea recedens ; typus : Gillman 237 in herbario amaniensi.

Frutex. *Rami* novelli tomentelli ; vetustiores cortice cinereo vestiti. *Folia* petiolo tomentello 0·8–2·5 cm. longo instructa ; lamina lanceolata vel oblonga, 7–13 cm. longa et 2·7–4·6 cm. lata, apice acuminata, basi acuta, herbacea, foliorum juniorum siccitate nigrescens, vetustiorum olivaceo-brunnea, supra costa canaliculata sola pubescens, subtus costa nervisque sparse pilosa, costa subtus prominente, nervis utroque latere costae 7–11 subtus prominulis. *Stipulae* extus tomentellae, in vaginam 5–6 mm. altam utroque latere arista 2 mm. longa coronatam connatae, axilla dense sericeo-villosae. *Rami floriferi* ad apicem jugis foliorum duobus vel tribus coronati ; ubi tria juga adsunt inferius ab aliis remotum. *Inflorescentia* tomentella, late et laxe corymbosa, floribus 70–100. *Calyx* tomentellus, tubo 0·5 mm. alto, dentibus 4 mm. longis. *Corolla* extus tomentella, tubo 28 mm. longo et 1·2 mm. diametro intus piloso, lobis 5·5 mm. longis et 1·2 mm. latis acutis. *Stylus* 5·3 cm. longus.

Tanganyika Territory. Bukoba District. Nyakate, *Gillman* 237 (Amani Herb.)* " shrub in fringing swamp", April 1935.

235 a. **Pavetta acrochlora** *Brem.* n. spec. ad sectionem *Dolichosiphonem*, seriem *Dentarum* pertinens ; maxime ut *P. leucosphaera* Brem. a qua differt foliis subtus sparse scabrido-pubescentibus, nervis hirsutis, ramis floriferis rectis et corolla lobis apiculatis ; typus : Purseglove 625 in herbario kewensi.

Frutex subscandens. *Rami* novelli hirsuti ; vetustiores cortice cinereo vestiti. *Folia* petiolo 0·7–2 cm. longo hirsuto instructa ; lamina oblonga vel anguste obovata, plerumque 8–11 cm. longa et 2·5–4·2 cm. lata, ea foliorum basi inflorescentiae insertorum tamen interdum minor, omnium apice acuta vel subacuminata, basi cuneata, herbacea, siccitate vix conspicue discolor, supra glabra et nitidula, subtus costa nervisque densius, ceterum sparse hirsuta, costa subtus prominula, nervis utroque latere costae 5–7 prominulis. *Stipulae* ovatae, acuminatae, circiter 5 mm.

*Gillman 237 in the Kew Herbarium is *Pavetta kiwuense* K. Krause.

longae, extus hirsutae, axilla sericeo-villosae. *Rami floriferi* foliis subaequilongi, recti, ex internodio singulo formati, duobus jugis foliorum coronati. *Inflorescentia* subumbellata, sphaerica, hirsuta. *Ovarium* subglabrum. *Calyx* tubo 0·6 mm. alto, dentibus hirsutis 5·5–6 mm. longis. *Corolla* alba, siccitate haud conspicue discolor, extus glabra, tubo 17–19 mm. longo et 1·4 mm. diametro intus sparse piloso, lobis 5·5 mm. longis apice viridi mucronatis. *Stylus* 4 cm. longus.

Uganda. Ankole, Igara, in lowest tier of Kalinzu Forest, alt. 1500 m., *Purseglove* 625 (Kew Herb.), " scandent undershrub with white flowers tipped with green", Mar. 1939.

238 a. **Pavetta trichotropis** *Brem.* n. spec. ad sectionem *Dolichosiphonem*, seriem *Glabristipularum* pertinens, maxime ut *P. kenyensis* Brem., sed foliis majoribus pro rata angustioribus supra totis glabris, stipulis axilla pilis sericeis instructis, calycis dentibus longioribus ab ea recedens ; typus : Gardner 611 in herbario amaniensi.

Fruex, siccitate nigrescens. *Rami* novelli glabri ; vetustiores cortice griseo-brunneo deinde albicante nitidulo vestiti. *Folia* petiolo glabro 6 cm. longo instructa ; lamina lanceolata vel elliptico-lanceolata, plerumque 5·5–10 cm. longa et 1·5–2·7 cm. lata, apice acuminata et mucronata, basi cuneata vel contracta, supra glabra et opaca, subtus costa hirsuta, nervis pilis paucis sparsa, subcoriacea, costa subtus prominente, nervis utroque latere costae circiter 8, nodulis paucis sed magnis. *Stipulae* in vaginam scariosam 7 mm. altam utroque latere arista 0·8 mm. longa instructam connatae, extus intusque glabrae, axilla tamen pilis sericeis minutae. *Rami floriferi* plerumque duobus jugis foliorum plus minusve remotis instructi. *Inflorescentia* glabra, plus minusve contracta, floribus circiter 45. *Calyx* 5 mm. altus, tubo 2 mm. alto, dentibus 3 mm. longis. *Corolla* extus glabra, tubo 17 mm. longo et 1·1 mm. dimatero intus piloso, lobis linearibus acutis 7 mm. longis. *Stylus* 3·5–4 cm. longus.

Kenya. Marakwet Hills, *Gardner* 611 (Amani Herb. from Imp. For. Inst. Herb.), June 1932.

Tanganyika Territory. Kindoroko, alt. 2100 m., *Davies* 1166 (Amani Herb.), 23 Febr. 1936 ; vern. name : *mtasara*.

The specimen collected in Tanganyika has somewhat wider leaves, some of them reaching a width of 3·8 cm. and a length of 9 cm. In other respects it agrees however quite well with the type.

268 a. **Pavetta greenwayi** *Brem.* n. spec. ad sectionem *Crinitam*, seriem *Pubescentium* pertinens ; maxime ut *P. refractifolia* K. Sch. et *P. cataractarum* S. Moore, sed foliis multo majoribus, calycis lobis corollae tubo paulo breviroibus, corolla breviore ab iis faciliter distinguenda ; typus : Greenway 7582 in herbario kewensi.

Arbuscula usque ad 4·5 m. alta. *Rami* novelli tomentelli ; vetustiores cortice albido opaco vestiti. *Folia* in petiolum tomentellum 0·5–1 cm. longum contracta ; lamina elliptica, 11–18 cm. longa et 6–11 cm. lata, apicem et basin versus paulum contracta, apice ipso obtusa, herbacea siccitate supra olivacea, supra primum tomentella, deinde scabridula,

subtus griseo-tomentella, costa nervisque tomentosa, costa subtus prominente, nervis utroque latere costae 10–11, nodulis parvis. *Stipulae* extus dense pubescentes, triangulares, 9–10 mm. longae, apiculatae vel breviter aristatae, axilla sericeo-villosae. *Rami floriferi* ex internodio longo singulo formati, apice duobus jugis foliorum coronati ; folia jugi inferioris ad petiolos circiter 1·5 cm. longos redacta. *Inflorescentia* tomentosa, subumbellata, floribus 30–40. *Calyx* tubo subnullo, lobis linearibus acutis 7–9 mm. longis usque ad 1·0 mm. latis. *Corolla* extus glabra, tubo 11 mm. longo 1·0 mm. diametro intus piloso, lobis linearioblongis 7 mm. longis et 2·8 mm. latis obtusis intus ad basin pilosis. *Stylus* 23 mm. longus.

Tanganyika Territory. S. Mbulu District. Nangwa, E. slope of Mt. Hanang, alt. 2200 m., *Greenway* 7582 (Kew Herb.), " common but scattered in the undergrowth of *Calodendrum capense*, *Celtis kraussiana*, *Elaeodendron*, *Ekebergia*, *Maba abyssinica*, *Teclea simplicifolia*, *Albizzia maranguensis* evergreen forest, on a dark greyish-brown loam of volcanic origin in a mountain gorge", 4 Febr. 1946".

327 a. **Pavetta somaliensis** *Brem.* n. spec. ad sectionem *Brachypodem*, seriem *Glabristipularum* pertinens ; a speciebus aliis huius seriei ramis lateralibus sympodialibus faciliter cognoscenda ; typus Glover & Gilliland 1160 in herbario amaniensi.

Arbor, ramis lateralibus sympodialibus. *Rami* novelli subglabri ; vetustiores cortice cinereo opaco vestiti. *Folia* subsessilia, lanceolata vel anguste oblonga, plerumque 2–3·5 cm. longa et 0·8–1·2 cm. lata, apice obtusa et vix conspicue calloso-mucronata, basin versus contracta, coriacea, siccitate vix conspicue discoloria, subtus primum sparsius pilosa sed mox utrimque glabra, costa subtus prominente, nervis utroque latere costae 4–5 vix conspicuis, venulis haud distinguendis. *Stipulae* in vaginam truncatam 1·5 mm. altam utroque latere mucronatam connatae, extus sparse pubescentes, intus glabrae. *Rami floriferi* 0·5–2 cm. longi. *Inflorescentia* subcontracta, glabra, floribus circiter 24. *Calyx* tubo 0·7 mm. alto, lobis late triangularibus vel in dentes contractis 0·4 mm. longis. *Corolla* extus glabra, colore ignoto, tubo 10 mm. longo et 0·9 mm. diametro fauce paulum dilatato intus piloso, lobis linearioblongis 5 mm. longis et 1·5 mm. latis. *Stylus* 20 mm. longus.

Somaliland. Gan Libah, Golis Range, *Glover & Gilliland* 1160 (Kew & Amani Herb.), 9 July 1945, " occasional tree in deep forest" ; vern. name : *bies*.

The inwardly glabrous stipules are a somewhat unexpected feature, for this species looks at first sight very much like *P. assimilis* Sond. and other members of the series *Campicolae*, from which it differs, however, also in its larger dimensions. The fact that it was found in " deep forest " is also noteworthy, for the members of the series *Campicolae* show a preference for open communities. The series *Scandentes*, *Glabristipulae* and *Campicolae* are, however, nearly related and might perhaps be better united.

332 c. **Pavetta pleiantha** *Brem.* n. spec. ad sectionem *Brachypodem*, seriem *Campicolarum* pertinens, structura monopodiali ramorum lateralium ad *P. gardeniifoliam* Hochst., *P. petraeam* Brem., *P. termitariam* Brem. accedens, indumento ramulorum necnon inflorescentiarum *P. termitariae*

var. *pubescenti* similior, calyce subglabro et multo breviore, foliis subsessilibus tamen ab ea faciliter distinguenda ; typus : Gillman 536 in herbario kewensi.

Frutex, ramis lateralibus monopodialibus. *Rami* novelli dense pubescentes ; vetustiores cortice cinereo opaco fissurato vestiti. *Folia* subsessilia, elliptica vel rhomboidea, plerumque 2·2–4·5 cm. longa et 1·1–2·2 cm. lata, apice acuta vel obtusa, calloso-mucronata, basi acuta, subcoriacea, siccitate haud conspicue discoloria vel brunnescentia, nunc costa subtus densius pubescente excerta utrimque subglabra (var. **glabrifolia** *Brem.*), nunc supra primum scabridulo-pilosa, deinde costa pubescente excepta glabra, subtus dense et molliter pubescentia (var. **velutina** *Brem.*), costa subtus prominente, nervis utroque latere costae 5–8 subtus colore saturatiore cognoscendis. *Stipulae* in vaginam dense pubescentem utroque latere arista brevi coronatam connatae, intus sericeo-villosae. *Rami floriferi* 0·5–13 cm. longi ; longiores ex internodiis pluribus compositi, quoque nodo inflorescentiis oppositis gerente. *Inflorescentia* laxe corymbosa, dense hirtella, floribus usque ad 50. *Calyx* subglaber, 0·9 mm. altus, tubo 0·6 mm., dentibus 0·3 mm. longis. *Corolla* colore ignoto extus tota glabra, tubo 7–8 mm. longo, lobis 4 mm. longis et 1·8 mm. latis *Stylus* 13–15 mm. longus.

Tanganyika Territory. Bukoba District. Nshamba, *Gillman* 536 (Kew Herb., var. *glabrifolia* Brem. ; a sheet in the Amani herbarium contains side by side a branch of the var. *glabrifolia* and one of the var. *velutina* Brem.), 17 March 1936, " shrub in *Acacia-Parinari* association on grey gravel loam on shallow hill top".

336 a. **Pavetta tomentella** *Brem.* n. spec. ad sectionem *Brachypodem*, seriem *Campicolarum* pertinens, ramis sympodialibus et foliis parvis ad *P. heidelbergensem* Brem. accedens, sed foliis supra demum plus minusve glabrescentibus numero minore nervorum instructis, floribus minoribus, ovario tomentello, calyce sparce pubescente ab ea diversa ; typus : Gillman 528 in herbario amaniensi.

Frutex, ramis lateralibus sympodialibus. *Rami* novelli dense pubescentes ; vetustiores cortice cinereo opaco fissurato vestiti. *Folia* subsessilia, obovata vel elliptica, plerumque 2·5–3·5 cm. longa et 1·2–2·0 cm. lata, apice rotundata, mucrone calloso deciduo munita, basi contracta vel acuta, subcoriacea, siccitate olivacea, primum utrimque tomentella, deinde supra sparse pubescentia, dimidio inferiore costae tamen persistenter tomentella, costa subtus prominente, nervis utroque latere costae 5 vix conspicuis. *Stipulae* in vaginam dense pubescentem utroque latere breviter aristatam connatae, intus dense sericeo-villosae. *Rami floriferi* plerumque 2–10 mm. longi. *Inflorescentia* laxe corymbosa, tomentella, floribus plerumque 9–15. *Ovarium* tomentellum. *Calyx* sparse pubescens, 0·5 mm. altus, breviter repandodentatus. *Corolla* tubo 5·5 mm. longo, lobis 4 mm. longis et 1 mm. latis. *Stylus* 10 mm. longus.

Tanganyika Territory. Bukoba District. Nshamba, *Gillman* 528 (Kew & Amani Herb.) 27 Febr. 1936, " shrub in bush savannah on grey gravel loams".

337 a. **Pavetta fossorum** *Brem.* n. spec. ad sectionem *Brachypodem*, seriem *Campicolarum* pertinens et *P. hochstetteri* Brem. valde affinis, foliis angustioribus, nervis vix conspicuis et paucioribus, calycis lobis late triangularibus ab ea distinguenda ; typus : Collenette 284 in herbario kewensi.

Frutex 1·5–2·0 m. altus, ramis lateralibus monopodialibus. *Rami* novelli glabri ; vetustiores cortice cinereo opaco fissurato vestiti. *Folia* subsessilia, linearia, 2–4·5 cm. longa et 5–10 mm. lata, apice rotundata et vix conspicue calloso-mucronata, basin versus sensim attenuata, coriacea, siccitate brunnea vel olivacea, tota glabra, costa supra interdum canaliculata subtus prominente, nervis utroque latere costae circiter 6 vix distinguendis. *Stipulae* in vaginam subtruncatam vix 2 mm. altam utroque latere mucronulatam connatae, intus dense sericeo-villosae. *Rami floriferi* 0·2–2·5 cm. longi. *Inflorescentia* laxe corymbosa, glabra,floribus 9–30. *Calyx* tubo 0·6 mm. alto, lobis late triangularibus 0·4 mm. longis. *Corolla* extus glabra, luteola, fragrans, tubo 7·5–9 mm. longo et 0·8 mm. diametro fauce dilatato intus dense arachnoideo, lobis lineari-oblongis 5 mm. longis et 1·6 mm. latis. *Stylus* 21 mm. longus.

Somaliland. Sugli, Al Hills, lat. 10° 58′ N., long. 48° 53′ E., alt. 1600 m., *Collenette* 284 (Kew Herb.), 14 Nov. 1929, " on rocky soil in rather exposed position ; shrub of 6 ft. of rather straggly growth ; vern. name : *gotimah-somih* (Warsangeli) =" dig-useful", i.e. the wood is strong and can be used for digging ; Molidese, *Glover & Gilliland* 569 (Kew & Amani Herb.), 24 Jan. 1945, " shrub of 5 ft. ; vern. name : *medanga*".

VII INTERNATIONAL BOTANICAL CONGRESS, STOCKHOLM, 1950.

Proposals for the alteration of the International Rules of Botanical Nomenclature (incl. proposed additions to the list of *nomina generica conservanda*) must be submitted before July 1, 1949, to the Rapporteur général, Dr. J. Lanjouw, Botanical Museum, Lange Nieuwstraat 106, Netherlands. At least 5 printed or typewritten copies of each proposal are required.

The Executive Committee.

ON THE FLORA OF ST. HELENA.

W. B. Turrill.

A good deal was written during last century on the flora of St. Helena. Emphasis was laid in many accounts on the endemic character of a large proportion of the natural indigenous flora and on its considerable depletion by goats which were introduced in 1513 and destroyed in or soon after 1810.

Only a few St. Helena species were known to botanists before the researches of W. J. Burchell who was resident in the island from 1805 to 1810. Burchell's St. Helena collections are at Kew and in addition the following Burchell manuscripts dealing with the island are preserved at Kew :

1. A valuable collection of drawings and paintings, of landscapes and other scenes and of plants, mounted on sheets and bound as a large folio volume.
2. Flora Heleniana, a small octavo volume, mainly of Latin descriptions of the plants. This should be of very great use to anyone preparing a full descriptive flora of St. Helena.
3. Flora Insulae St. Helenae, in a tabulated form, bound as a folio volume.

None of Burchell's manuscripts on St. Helena was published but his specimens are listed in the later account of Hemsley (*infra*). It may be also noted that some are quoted, and some were used in the preparation of the figures, in Hooker's Icones Plantarum, tt. 1021, 1031, 1033, 1034, 1035, 1045, 1052, 1053, 1054, 1055, 1056, 1057, and 1058.

" An Alphabetical List of Plants, seen by Dr. Roxburgh growing on the Island of St. Helena, in 1813–14 " was published as an appendix (pp. 295–326) in Beatson, Tracts relative to the island of St. Helena (London, 1816). The names in Roxburgh's list, with additions and a Preface, were published in the Linnean classification, under the Linnean classes, as Flora Sta. Helenica (St. Helena, printed by J. Boyd, 1825). There is nothing in this publication itself to indicate who was responsible for its preparation. Pritzel, Thesaurus Lit. Bot. ed. 1, 316 (1851) and ed. 2, 339 (1872) gives " Watson, Alexander " as the author. Beatson's Christian name was " Alexander " and it seems probable that an error occurred in Pritzel's compilation, " Beatson " being transformed into " Watson". Alexander Beatson (1759–1833) was governor of St. Helena from 1808 to 1813, when the island belonged to the East India Company (see Dict. Nat. Biography **4,** 20 : 1885, and P. Gosse : St. Helena 1502–1938, 243–262, London 1938). However, there is no internal evidence that either Beatson or the mythical " Watson " actually compiled the work.

Another pamphlet in the Kew Library has the following title-page " An alphabetical list of indigenous and exotic plants, growing on the island of St. Helena, compiled by Stephen F. Pritchard Esq. and corrected by Mr. James Bowie, Botanist, Ludwigsburg Garden, Cape Town, Cape of Good Hope. Printed by G. J. Pike, 11 St. George's-Street, 1836." The alphabetical list is of Latin names with English, or anglicized, names in parallel columns.

In the Kew Library (Tracts, under Roxburgh) there is a separate of 10 pages with the title " Botany of St. Helena", with a pencil note by J. D. Hooker " Procured at the Cape of Good Hope in 1843 said to be reprinted from Beatson's Tracts". It is probably a part of the St. Helena " Monthly Register " for 1843 and is a rearrangement of some of the names with notes on some of the plants in the appendix to Beatson's Tracts, arranged in the Linnean classification.

In 1825, there was published in Paris, the " Mémoires du docteur F. Antommarchi ou les derniers momens de Napoléon " 2, with an "Esquisse de la Flora de Sainte-Hélène". This is a classified list of families, genera, and species with descriptions. The work has a very poor reputation (see Hemsley, *infra*, p. 52).

J. D. Hooker spent nine days on St. Helena in January and February and a few more days in May 1843. He utilized his collections and experiences in preparing the paragraphs on St. Helena in his " Lecture on Insular Floras " (published London, 1896, delivered in 1866).

" St. Helena : a physical, historical, and topographical description of the island, including its geology, fauna, flora, and meteorology " by J. C. Melliss (London, 1875) is one of the most important books on the island. The account of the botany occupies pp. 221 to 383 and includes an introduction, a list, with notes, of all the recorded species, and coloured plates of many of the endemic seed-plants.

The Colonial Office, in 1884, published " A report upon the present position and prospects of the agricultural resources of the island of St. Helena " by D. Morris. This contains a useful coloured map. The pamphlet was reprinted in 1906.

Much of the earlier work referred to above was incorporated in the account of St. Helena published by W. B. Hemsley, in the Report . . . . H.M.S. Challenger, Botany 1, Part 2, pp. 49–122 (1885).

A new species of spurge was described by Thellung and Stapf, under the name *Euphorbia heleniana*, in *Kew Bull.* 1916, 200, from material collected in St. Helena by Burchell, Melliss, Haughton, and Whitehead.

References have also been found to the following two works which are not quoted by Hemsley :

Beatson, A. Papers relating to the devastation committed by goats on the Island of St. Helena, 1810.

Wollaston, T. V. Coleoptera Sanctae-Helenae, London, 1877 (said to have interesting remarks on the plants).

Little appears to have been published in recent years on the flora and vegetation of St. Helena. It is, therefore, worth publishing extracts from an account received recently from Mr. G. C. Kitching, who refers to the help he received from the late Mr. H. F. D. Bartlett, a resident on the island. Mr. Kitching writes as follows :

" It may be of some help to botanists contemplating a visit to St. Helena to know something of the tracks by which they can visit the places they want to go to most, the summits and steep slopes of the central ridges."

Cabbage Tree Road.

" This runs across the leeward slopes of the highest part of the ridges from Stitches Ridge to Alarm Hill. The real name is Sich's. At the highest point a track diverges straight up the hill side to the summit of Actaeon and then straight along the top of the ridge to Diana's Peak and so on down to Rock Rose. This is one of the most beautiful parts of the Island, thick with vegetation. If the botanist will persevere and scramble down the side of the Peak, as if going to Rock Rose, he will find a beautiful little forest of tree ferns."

Wrangham's to Arno's Vale.

" This track is used only by flax cutters and in part is very muddy, very wet, and heavily overgrown, and occasionally very steep. From Wrangham's it winds across the entire southern face of Diana's Peak reaching to about a hundred feet of the summit. At the highest point it reaches it is possible to clamber up the side of the Peak. Then as if returning to Actaeon proceed for about fifty yards to a point on the right where a track can be seen in the flax below which leads to the main road at the bottom of Arno's Vale. I believe it to be very doubtful if any scientific botanist has ever traversed this route since according to local information the part where it crosses the peaks was not made until quite recent times."

Cason's Gate to High Peak.

" A short distance down the Fairy Land road a flax cutters track will be seen on the right. By using this track it is possible to walk around the head of Peak Gut, and in the vegetation on the higher slopes of High Peak which is otherwise inaccessible."

Man and Horse.

" This is much the same as a stiff climb up a very steep arterial road, a bottom gear business. Some magnificent scenery and flora is the rich reward at the end of it."

" Because some specimen is not to be found in my list it must not be supposed that some treasure has disappeared or died away. The three species of *Wahlenbergia* are a case in point : two are still abundant, but I was never able to find *W. burchellii* neither were my family and the friend who imposed this task on me. To see the St. Helena flora at its best one must stand on those majestic cliffs called Old Joan, 2,400 ft. above the deep blue wastes of the South Atlantic, with St. Helena Tea at one's feet and Old Father Live for Ever, its delicate white flowers blowing in the trade wind, both defying every rule of depth of soil and wind break. Old Joan is one of the glories of St. Helena and it is a misfortune so few can enjoy her."

The following list of plants found to be growing in St. Helena has been slightly modified in regard to its nomenclature. The species marked with an asterisk were from Mr. Bartlett's records, the remainder were found by Mr. Kitching except for an extra record for *Plantago robusta*.

Asplenium platybasis Kze. Cabbage Tree Road, 1930*.

Commidendrum robustum DC. " Gumwood Tree." Many places, 1934.

Commidendrum rugosum (Ait.) DC. " Scrub Wood". Man and Horse, 1936.

Dicksonia arborescens L'Hérit. " Tree Fern". Diana's Peak, 1939.

Diplazium nigropaleaceum Kze. Ridges, 1930*.

Dryopteris dianae (Hook.) C. Chr. (*Polypodium dianae* Hook.) Cabbage Tree Road, 1930*.

D. napoleonis (Bory) O. Kze. (*Nephrodium napoleonis* Bory). 1930*.

Euphorbia heleniana Thell. et Stapf. Potato Bay, 1930*.

Frankenia portulacifolia Spreng. " St. Helena Tea". Man and Horse, 1935.

Hymenophyllum capillaceum Roxb. On cabbage trees, 1938*.

Lobelia scaevolaefolia Roxb. Diana's Peak, 1937.

Melanodendron integrifolium (Roxb.) DC. " Black Cabbage Tree". Ridges, 1934. Alarm Cottage, cultivated, 1934.

Mesembryanthemum cryptanthum Hook. f. Sandy Bay, 1934 and 1939.

Microstaphyla furcata (L.f.) Fée [Acrostichum bifurcatum (Jacq.) Sw. ; Elaphoglossum furcatum (L.f.) Christ]. On walls, rocks, etc., chiefly above Sandy Bay, 1930*.

Pelargonium cotyledonis L'Hérit. " Old Father Live for Ever". Man and Horse, 135.

Petrobium arboreum R. Br. " White Wood Cabbage Tree". High Peak, 1938.

Plantago robusta Roxb. Sandy Bay, 1925 ; Waterfall, J. Bruins Lich, 1930.

Pteris paleacea Roxb. 1930*.

Senecio leucadendron (Forst.) Benth. et Hook. f. (*Pladaroxylon leucadendron* Hook. f.). " He Cabbage Tree". Diana's Peak, 1935.

Sium burchellii (Hook. f.) Hemsl. (*Lichtensteinia burchellii* Hook. f.) " Dwarf Angelica". High Peak, 1938.

S. helenianum Hook. f. " St. Helena Angelica". Lower slopes of Diana's Peak, 1938.

Wahlenbergia angustifolia (Roxb.) DC. Fairy Land Road, 1934.

W. linifolia (Roxb.) A. DC. Cabbage Tree Road, 1938.

The very great phytogeographical interest of the indigenous flora of St. Helena is obvious from the discussions in the works of Hooker, Melliss, and Hemsley. Wallace (Island Life, 294–297 : 1880) also gives a useful concise account. It is, therefore, very satisfactory news that at least about 24 species of the original flora, and probably many more, are still existing on St. Helena.

The known idigenous species of vascular plants of St. Helena are 66 in number. The following tabulation gives more details.

Indigenous species of Spermatophyta ...	39
Indigenous species of Vascular Crytogams	27
Endemic species of Spermatophyta ...	38
Endemic species of Vascular Cryptogams	12
Indigenous genera of Spermatophyta ...	28
Indigenous genera of Vascular Cryptogams	13
Endemic genera of Spermatophyta ...	5
Endemic genera of Vascular Cryptogams	0

The closest affinities of the flora are considered to be with the flora of Africa, and particularly of southern Africa. Of the 28 indigenous genera of Spermatophyta, 22 are represented in the flora of South Africa. The 5 endemic genera have the following taxonomic affinities :

Nesiota (*Rhamnaceae*), near to *Phylica*, a genus of S. Africa and the islands of the Atlantic and Indian Oceans.

Commidendron, *Melanodendron*, and *Petrobium* (*Compositae*), placed near to South American genera.

Mellisia (*Solanaceae*) related to the Central and South American genus *Saracha*.

The fern genus *Microstaphyla* should be mentioned in this connection. According to a recent revison (Maxon, W. R. The genus *Microstaphyla*, in Journ. Wash. Acad. Sci. **13,** 28–31 : 1923) it consists of three known species : *M. furcata* (L.f.) Fée, from St. Helena ; *M. moorei* (E. G. Britton) Underw., from Bolivia ; and *M. columbiana* Maxon, from Colombia. The St. Helena species would thus appear to be another link between the St. Helena and South American floras. It must, in fairness, be noted that " affinities " in the arborescent *Compositae* are matters of some doubt which need re-investigating by the use of more extensive criteria than those used by Bentham whose views are most often quoted in this connection.

With regard to the natural vegetation of St. Helena at the present time very little is known. It may be suggested that a survey on modern lines, especially of the central ridges and of the areas immediately on the coast, would throw considerable light on the past history of the plant life and would suggest the best means of preserving what still remains of the indigenous flora. The earlier records speak of the island being entirely covered with forests, which were probably dominated over large areas by the native " ebony" (*Melhania melanoxylon*). Even in 1709 this tree was in such quantities that it was used for the burning of lime. Forest destruction by cutting and by the grazing of goats, together with the prevention of rejuvenation by the latter factor, were probably more important in changing the plant cover than the introduction of the numerous exotics recorded by Beatson and by Melliss. An ecological survey could probably lead to experiments being suggested whose results might have considerable importance by indicating how re-afforestation by native trees would increase the economic value of the parts of the island best suited for cultivation. The report by D. Morris, quoted above, indicates that the destruction of the forests was an economic as well as a scientific misfortune.

THONNINGIA Vahl.

A. A. Bullock.

Difficulty in the identification of specimens of the parasitic genus *Thonningia* Vahl (Balanophoraceae) from Hemsley's (1911) key and descriptions led to an examination of all the material preserved in the Kew herbarium and all that is at present available at the British Museum. Thanks are due to the authorities at the British Museum for study facilities freely placed at my disposal and also to Prof. Humbert for the loan of the type specimen of *Thonningia sessilis* Lecomte from Paris.

The specimens in spirit* described by Hemsley had been dried by him and mounted on herbarium sheets and the only spirit material now available at Kew is that collected by Dr. W. J. Eggeling in Uganda and by my colleague Mr. E. W. B. H. Milne-Redhead in Northern Rhodesia and the Gold Coast. Mr. Milne-Redhead also assisted me in the preliminary examination of the material, which indicated the probability of the conclusions outlined below. Further, Dr. W. Robyns of Brussels informs me that whilst working on his material from the eastern Congo which might have been identical with *Thonningia ugandensis* Hemsl., he concluded that all his specimens were conspecific with the original *T. sanguinea* Vahl and that the name *T. ugandensis* should be reduced to synonymy.

As delimited by Hemsley (1911), the genus included six species confined to Africa and one confined to Madagascar. The African species were divided into two groups according to the [supposed] unisexuality or bisexuality of the flower-heads.† Thus *T. sanguinea* Vahl, *T. elegans* Hemsl., *T. dubia* Hemsl. and *T. ugandensis* Hemsl., are stated to have strictly unisexual flower-heads, whilst *T. sessilis* Lecomte and *T. angolensis* Hemsl. are stated to have bisexual flower-heads. The Madagascar species *T. malagasica* Fawcett (1886) is also described as having unisexial flower-heads, but I am inclined to the view that this plant should be removed from *Thonningia* to form another monotypic and endemic genus, particularly on account of the regular perianth of the male flowers. Harms (1935) places it, following Engler (1889), in a distinct section. Baker (1883) adopted a manuscript name, *Cephalophyton parkeri*, used by Hooker for this plant.

The specific differences between the " species " of Hemsley's two groups, as indicated in his key and descriptions, are very slender and refer to just those characters which one would expect to vary under different ecological conditions. Thus it is here postulated that the character " Flower heads globose " as against " Flower heads ovoid " depends more on the age and vigour of the plant than upon any genetical difference. Similarily the length of the " peduncle " has been shown by later collections to vary considerably on the same plant, according to the depth below the soil surface of the rhizome from which it arises. The

*Until the late 1920's there were at Kew no adequate facilities for the maintenance of a spirit collection. Since then, largely owing to the enthusiasm of my colleague Mr. V. S. Summerhayes, a very extensive study collection has been built up and is being continuously increased.—A. A. B.

†Lecomte (1896) described *T. sessilis* as " monoica", but this term applies to the plant as a whole and not necessarily to the individual flower heads. There is no doubt, however, that he intended the latter.—A. A. B.

variation in peduncle length observable in the Kew specimens covers all Hemsley's " species." The remaining variable " key " character, the shape of the tips of the bracts, is also non-specific. " Acute ", " very acute", " acuminate " and " elongate-acuminate " bracts can be found on different flower-heads of the same plant and sometimes even on different parts of the same flower-head. Dissection of the types of the species concerned yields no better diagnostic characters and it is therefore concluded that *T. sanguinea*, *T. dubia*, *T. elegans* and *T. ugandensis* are morphologically inseparable and all should be referred to *T. sanguinea* Vahl (1810).

The case of the alleged " bisexual " species must be regarded as less clear. The material of *T. sessilis* Lecomte is very scanty and the detached portion (dissected by permission of Prof. Humbert) yields no sign of the female flowers described by Lecomte. Similarly, I have been unable to confirm the presence of female flowers in heads of *T. angolensis* Hemsl. In both cases the flower heads are smaller than fully developed heads of *T. sanguinea*, though young specimens of the latter are strictly comparable with them. Also I have observed in male flower heads of *T. sanguinea* that the outermost flowers are clearly non-functional and might in some cases be mistaken for female flowers. In these circumstances I propose to reduce both *T. sessilis* and *T. angolensis* (they are certainly conspecific with each other) to *T. sanguinea*, with the *proviso* that the position must be reviewed when further (mature) material becomes available.

The literature on the relationships of the genus *Thonningia* is scanty. Following Sir J. D. Hooker's (1859) scholarly account of the Balanophoraceae there have been only the purely systematic accounts of Eichler (1873), Bentham and Hooker (1880), Engler (1889) and Harms (1935), together with the more detailed account by Van Tieghem (1907) which was more concerned with theoretical implications than with the taxonomy of the species. Curiously, *Thonningia* is not mentioned in any edition of Wettstein's " Handbuch". Biedermann's (1882) account I have not seen.

Mangenot (1947) has given an excellent resumée of previous work on the anatomy and morphology of the Balanophoraceae in general and follows Van Tieghem (1907) in grouping *Thonningia* with its New World counterpart *Langsdorffia* in a separate family, the *Langsdorffiaceae*, mainly on anatomical grounds. In view of the extreme specialisation of the genera of *Balanophoraceae*, however, and the observed inter-generic variation in anatomy related to the exact mode of entry into the host tissue, there seems to be as much difference between *Thonningia* and *Langsdorffia* as between either of these two and other genera of *Balanophoraceae*. The maintenance of a distinct family name for them is not, therefore, justified. Apparently, Mangenot did not consult any taxonomic work later than Engler (1889), since he mentions only *T. sessilis* and and *T. malagasica* in addition to Vahl's species, to which, by some strange *lapsus* he applies the name " *Thonningia coccinea* Vahl " in both title and text of his paper.* For the rest, Mangenot's paper is a careful account of an examination of the anatomy of *T. sanguinea*, apparently from new material, an account of

* This is, however, corrected in an *erratum* note. M. Mangenot also informs me (*in litt.*), that he was aware of the other names, but regarded them as synonyms.

its cytology as revealed by the stamens and an account of its parasitism. He recorded a first list of hosts (for the Ivory Coast) as (among others not identified), *Bridelia micrantha*, *Baphia nitida*, *Funtumia africana*, *Myrianthus arboreus* and *Antiaris africana*. He noted also the wide range of forest habitats from coastal and montane rain forest to deciduous forest, with an apparent preference for secondary growth. Mr. Milne-Redhead informs me that his Gold Coast specimen came from a small isolated stand of forest at the edge of the forest belt, whilst his Rhodesian specimens were collected in semi-deciduous *Cryptosepalum* woodland on Kalahari sand. He also noted that the plant occurred in fairly large unisexual colonies ; he did not find a female colony nearer to a male colony than 1½ miles, in spite of careful search in the neighbourhood of both. Also, Mr. A. S. Thomas informs me that in Uganda it is widespread in the forest areas and is far more common than is generally supposed.

Beyond the fact that *Thonningia* is a parasite on the roots of forest trees, little, therefore, is known if its ecology and biology. According to Farquharson (1918) it freely parasitizes Para rubber (*Hevea brasiliensis* Müll. Arg.) in the Nigerian plantations, thus confirming Mangenot's statement that it is not specific in its choice of host. Other authors (Engler and Drude, 1910, De Wildeman, 1911 ; Staner, 1933) go no further than the simple statement that it is a forest parasite. Nothing is known of the mechanism of pollination. Most collections include only male or only female inflorescences, and this, in conjunction with Mr. Milne-Redhead's observations (*supra*), and the fact that seeds are unknown indicates that pollination and seed production are extremely rare.

The published drawings of longitudinal and transverse sections of the ovary shows extreme reduction. The solitary ovule appears to be destitute of integuments and lies embedded in the almost undifferentiated tissue of the ovary, the apex of which is produced to form a slender style-like organ. There is no sign of any special stigmatic surface.

The distribution of *T. sanguinea* as here understood covers practically all the forest areas of tropical Africa and presents a more rational picture than if Hemsley's " species " are maintained. The Kew material includes specimens from Sierra Leone, Ivory Coast, Gold Coast, Northern and Southern Nigeria, Cameroons, Belgian Congo, Anglo-Egyptian Sudan, Uganda, Kenya Colony, Angola and Northern Rhodesia. Staner (1933) summarises the distribution in the Belgian Congo as follows " Bas Congo, Lac Léopold II, Equateur, Ikelemba, Lulonga, Bangala, Ubangi, Aruwimi, Ituri, Maniema, Sankuru, Kasai". The material I have seen at the British Museum is mainly that collected by Talbot in Southern Nigeria together with some few specimens more or less covering the same areas as the Kew collections cited below.

A selection of references to the literature are appended, followed by a list of the Kew specimens and a list of works referred to in the text above :

Thonningia *Vahl* in Dansk. Skrift (Act. Soc. Hist. Natur. Havn.), **6** : 124, t. 6 (1810); Hook. f. in Trans. Linn. Soc. **22** : 42, t. 3 (1856) ; Benth. et Hook. f. Gen. Pl. **3** : 236 (1800) ; Engl. in Engl. et Prantl, Nat. Pflanzenf. **3** : I, 263 (1889) ; Hemsl. in Dyer, Fl. Trop. Afr. **6** : I, 436 (1911) ; Harms. in Engl. et Prantl, Nat. Pflanzenf. ed. 2, **16 B**: 337 (1935).

T. sanguinea *Vahl, l.c.* ; Schum. et Thonn. Beskr. Guin. Pl. 431 (1827) ; Hook. Nig. Fl. 576 (1849) ; Hook. f. in Trans. Linn. Soc. **22** : 42, t. 3 (1856) ; Eichl. in DC. Prodr. **17** : 142 (1873) ; De Wild. Mat. Fl. Congo, **2** : 81 (1898), et Pl. Thonn. 13 (1900) ; Dawe, Rep. Bot. Miss. Uganda, 55 (1906) ; De Wild. Etud. Fl. Bas- et Moy.- Congo, **1** : 120 (1904) et *l.c.* **2**: 33 (1907) ; Dur. Syll. Fl. Congo, 476 (1909) ; Hemsl. in Fl. Trop. Afr. **6** : I, 438 (1911) ; De Wild. in Bull. Jard. Bot. Brux. **4** : 67 (1914) et *l.c.* **5** : 215 (1916) et Pl. Bequaert. **1** : 135 (1921) et *l.c.* **2** : 25 (1923) et *l.c.* **3** : 9 (1925) et Contrib. Fl. Katanga, Suppl. I, 43 (1927) ; A. Chev. Expl. Bot. Afr. Occ. Franç. 550 (1920) ; Hutch. et J. M. Dalz. Fl. W. Trop. Afr. **1** : 470 (1928) ; Irvine, Pl. Gold Coast, 413 (1930) ; Kennedy, For. Fl. S. Nigeria, 148 (1936) ; J. M. Dalz. Useful Pl. W. Trop. Afr. 298 (1937) ; Harms in Engl. et Prantl, Nat. Pflanzenf. ed. 2, **16 B** : 337 (1935).

T. angolensis Hemsl. in Kew Bull. 1911, 151, et in Dyer, Fl. Trop. Afr. **6** : I, 440 (1911) ; Harms in Engl. et Prantl, Nat. Pflanzenf. ed. 2, **16 B** : 338 (1935).

T. dubia Hemsl. in Kew Bull. 1911, 152, et in Dyer, Fl. Trop. Afr. **6** : I, 438 (1911) ; Hutch. et J. M. Dalz. Fl. W. Trop. Afr. **1** : 470 (1928) ; Harms in Engl. et Prantl, Nat. Pflanzenf. ed. 2, **16 B** : 337 (1935).

T. elegans Hemsl. in Kew Bull. 1911, 152, et in Dyer, Fl. Trop. Afr. **6** : I, 439 (1911) ; Hutch. et J. M. Dalz. Fl. W. Trop. Afr. **1** : 470 (1928). Harms in Engl. et Prantl, Nat. Pflanzenf. ed. 2, **16 B**: 337 (1935).

T. sessilis Lecomte in Journ. de Bot. **10** : 234, t. 1 (1896) ; Hemsl. in Dyer, Fl. Trop. Afr. **6** : I, 440 (1911) ; Harms in Engl. et Prantl, Nat. Pflanzenf. ed. 2, **16 B** : 337 (1935).

T. ugandensis Hemsl. in Kew. Bull, 1911, 152, et in Dyer, Fl. Trop. Afr. **6** : I, 439 (1911) ; Harms in Engl. et Prantl, Nat. Pflanzenf. ed. 2 **16 B** : 337 (1935).

" *T. coccinea* Vahl " ; Mangenot in Rev. Gén. Bot. **56** : 201–244 (1947).

Sierra Leone. Bagroo R., 1861, *Mann* 907. Without locality, Aug. 1912, *Kelsall.* Kabala, 1050 m., July 1930, *Glanville* 413. Jigaya, 330 m., Sept. 1914, *N. W. Thomas* 2769. Makali, Feb. 1945, *Deighton* 4088.

Ivory Coast. Danané, 390 m., June 1926, *Collenette* 41.

Gold Coast. Without locality, *Cummins* 192. Kanyiri, Feb. 1930, *A. S. Thomas* D.130. Aburi, March 1908, *Leslie.* Aburi, April 1900, *Johnson* 521 (type of *T. elegans* Hemsl.) Two miles north-west of Achimota, Sept. 1941, *Milne-Redhead* 5129.

Northern Nigeria. Mt. Purdy, Aug. 1857, *Barter.* Lokoja, Aug. 1906, *Elliot* 187. Abinsi, *Dalziel* 759.

Southern Nigeria.* Yoruba (land), *Millson* 145. Lagos, Feb. 1893, *Millen* 172.

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*" *T. sanguinea* was found by the Cambridge Botanical Expedition, 1947/48, to be a common plant in the Okomu Rererve near Benin; it is probably equally frequent throughout the forests of Southern Nigeria." This information was supplied by my colleague Mr. J. P. M. Brenan, who accompanied the expedition and observed the plant during the months December to February. He added that it appeared to be most abundant along paths or other places where some sunlight penetrated to the ground. At the time of his visit the flowers were not fully mature and it was not possible to observe the pollination mechanism or seed production. Mr. Brenan confirms that the variation in scape-length is a growth, not a specific, character.—A.A.B.

British Cameroons. Buea, Nov. 1927, *Migeod* 117. Buea, Jan. 1929, *Maitland* 376. Cameroons Mt., 1500 m., *Kalbreyer* 105 (type of *T. dubia* Hemsl.)

French Cameroons. Bipinde, *Zenker* 1737.

Belgian Congo. Kinchassa, Lower Congo, Nov. 1899, *Schlechter* 18203.

Anglo-Egyptian Sudan. Mt. Bazence, May 1937, *Myers* 6623.

Uganda. Entebbe,* *Dawe* (type of *T. ugandensis* Hemsl.). Budongo Forest, March 1933, *Eggeling* 1288. Mile 8, Mascha Road, Aug. 1937, *Chandler* 2786. Bokojo Forest, *Fyffe* 271. Bwamba, 750 m., in forest, a local parasite, rhizome pale yellow, 4 ins. below ground, flowers bright crimson, 14 Aug. 1938, *A. S. Thomas* 2372. Katwe, Toro, locally common parasite with bright red flowers, 29th July, 1939, *Hopkins* 3041.

Kenya Colony Kakamega Forest, Nov. 1934, *Dale* 3383.

Northern Rhodesia. Mwinilunga District. About 1 mile west of Dobeka Bridge in *Cryptosepalum* woodland, on sand ; plentiful, 30 Dec. 1937, *Milne-Redhead* 3875 (female plant of *Milne-Redhead* 3745). Near source of R. Matonchi in *Cryptosepalum* woodland, on sand ; rhizome horizontal, yellow, pubescent ; scape yellowish with pink bracts, all below ground, tips of involucral bracts just level with the soil (surface) ; bracts all pink, rigid and scaly ; tops of anthers and creamy white pollen showing ; perianth of 3 filiform pink growths on cream coloured stem ; male plant only seen ; 19 Dec. 1937, *Milne-Redhead* 3745.

Angola. Bembe, *Monteiro* (type of *T. angolensis* Hemsl.)

French Congo. " Bord de la Loukomba, affluent du Konilou, 1894." *Lecomte* (type of *T. sessilis* Lecomte, in Herb. Mus. Paris).

References

Baker, J. G., 1883.—Journ. Linn. Soc. Bot. **20** : 250.
Biedermann, F. von., 1882.—Ueber die Pflanzengruppe der *Rhizantherae* Endl. . . . . Sitz. Abh. Naturw. Ges. Isis, Dresden, 1882, 45–50, t. 2.
Bentham, G. and Hooker, J. D., 1880.—Gen. Pl. **3** : 236.
De Wildeman, E., 1911.—Études Fl. Bangala (Pl. Thonn. Sér. II.), 25, f. 4.
Eichler, A. W., 1873.—DC. Prodr. **17** : 142.
Engler, A., 1889.—Engl. et Prantl. Die Natürl. Pflanzenfam. **3** : 1, 263.
Engler, A. and Drude, O., 1910.—Veg. der Erde, **9** : 1, II, 657, f. 569.
Farquharson, C. O., 1918.—Kew Bull. 1918, 360.
Fawcett, W. 1886.—Trans. Linn. Soc. Ser. II. (Bot.), **2** : 238, t. 26.
Harms. H., 1935.—Engl. et Prantl, Die Natürl. Pflanzenfam. 2 Aufl. **16 B** : 337.
Hemsley, W. B., 1911.—Dyer, Fl. Trop. Afr. **6** : 1, 436.
Hooker, J. D., 1859.—Trans. Linn. Soc. **22** : 42, t. 3.
Hutchinson, J. and Dalziel, J. M., 1928.—Fl. W. Trop. Afr. **1** : 470.
Lecomte, H., 1896.—Journ. de Bot. **10** : 229, t. 1.
Mangenot, G., 1947.—Recherches sur l'organisation d'une Balanophoracée : *Theoningia coccinea* Vahl.—Rev. Gén. Bot. **54** : 201–244, ff. 25.
Staner, P., 1933.—Phanerogames parasites au Congo Belge, in Journées d'Agron. Colon.
Vahl, M. 1810.—Dansk. Skrift (Act. Soc. Hist. Nat. Havn.), **6** : 124, t. 6.
Van. Tieghem, P., 1907.—Ann. Sc. Nat. Sér. IX. **6** : 125–260.

* I have accepted the locality given by Hemsley for this specimen, though the labels on the sheet give only " Uganda, 1905 ".—A. A. B.

ON THE IDENTITY OF STATICE TETRAGONA Thunb.

A. A. Bullock.

As a result of a query from a correspondent, it became necessary to decide on the identity of *Statice tetragona* Thunb., described as a plant from the Cape of Good Hope but omitted from C. H. Wright's account of the Plumbaginaceae in the *Flora Capensis*.

Thanks are due to Professor Nannfeldt for the loan of Thunberg's herbarium specimen from Uppsala.

Examination at once showed that the locality shown on the Thunberg sheet, "*e cap. b. Spei*", was erroneous and that the specimen was in fact identical with the *Statice japonica* Sieb. et Zucc. which is apparently common on the coasts of Japan and Kôrea.

Bentham (Fl. Austral. **4,** 267 : 1869) united this species with *S. sinensis* Girard of the coast of China and also with *Taxanthema* (*Statice*) *australis* R. Br. from the coasts of eastern and southern Australia and Tasmania, but these plants seem to be distinct, as may be expected on geographical grounds.

The original description of *Statice japonica* includes a reference to *Statice limonium* Linn. sec. Thunb. Fl. Japon. 129 (1784), non Linn., but there is apparently no corresponding specimen in Thunberg's herbarium and the Linnean species does not occur in Japan. Thunberg, therefore, probably included it in his Flora from memory, the specimen having become mixed with his South African collections. Against this is the fact that the Japanese plant has yellow flowers, whilst the European plant has lavender flowers.

Statice japonica, on the above evidence, requires a new name and its synonymy is as follows :—

Limonium tetragonum (*Thunb.*) *Bullock*, comb. nov.

Statice tetragona Thunb. Prodr. Pl. Cap. 54 (1794), et Fl. Cap. **2,** 242 (1818), et Fl. Cap. ed. Schultzes, 276 (1823) ; Willd. Sp. Pl. **1,** 2, 1526 (1798) ; Pax in Engl. et Prantl, Natürl. Pflanzenfam. **4,** 1, 124 (1890) ; non Drège, Zwei Pflanzengeogr. Docum. 94 (1843).

Statice japonica Sieb. et Zucc. Pl. Japon. Fam. Nat. sect. alt. no. 679 (1846) ; Boiss. in DC. Prodr. **12,** 642 (1848) ; Franch. et Savat. Enum. Pl. Japon. **1,** 383 (1875) ; Matsumura, Ind. Pl. Japon. **2,** 483 (1812) ; Makino et Nemoto, [Fl. Japan] ed. 2, 914 (1931).

Statice limonium Linn. sec. Thunb. Fl. Japon. 129 (1784), non Linn.

Limonium japonicum (Sieb. et Zucc.) O. Kuntze, Rev. Gen. **2,** 394 (1891).

Statice australis (R. Br.) Spreng. sec. Benth. Fl. Austral. **4,** 267 (1869), partim, quoad syn. in adnot., non *Taxanthema australis* R. Br. Prodr. Nov. Holl. 426 (1810), nec *Statice australis* (R. Br.) Spreng. et auctt. australas.

ON ERIGERON BONARIENSIS LINN.

B. L. Burtt

There are three separate sources of confusion in the taxonomy of *Erigeron bonariensis* Linn. and allied species : uncertainty as to their correct position ; disagreement on specific limits ; and errors in typification of the names concerned.

The genera of *Compositae-Asteroideae* are notoriously difficult of satisfactory definition, and one of the problems is to delimit the boundary between *Erigeron* and *Conyza*. I use the name *Conyza* here in the sense of Lessing (Syn. Comp. 203 : 1832), whose concept of the genus has been generally adopted in the Floras of tropical countries. M. L. Green (Prop. Brit. Bot. Int. Congr. Cambridge, 1930, p. 181) points out that all the eleven species originally placed in *Conyza* by Linnaeus are now referred to other genera, and she proposes as lectotype of the genus *Conyza squarrosa* Linn. This is the plant we now call *Inula conyza* DC. and *Conyza* would therefore become a synonym of *Inula*. Any action to re-name all the species currently placed in *Conyza* is clearly most undesirable without a thorough taxonomic investigation of the whole group. Meanwhile the use of *Conyza* in the sense of Jussieu & Lessing is considered intelligible and, temporarily, justified. Cronquist [in Bull. Torr. Bot. Club, **70,** 629 (1943) and in Brittonia, **7,** 121 (1947)] places *E. bonariensis* and *E. canadensis* in *Conyza*, but without discussing the uncertainty in the application of this name, and I am therefore at present disinclined to follow his lead. Fortunately, however, the specific trivials of the species under consideration are equally available in *Conyza* if required.

Other genera which have a claim to include *E. bonariensis* and its allies are *Leptilon* Rafin. (based on *Erigeron divaricatus* L. and retained by Small Fl. Southeastern U.S. 1239 : 1903, and others) ; *Conyzella* Rupr. (based on *Erigeron canadensis* Linn.), and *Eschenbachia* Moench (based on *Erigeron aegyptiacus* Linn., a species referred to *Conyza* by Lessing). With all these *E. bonariensis* appears to have far greater affinity than with a typical *Erigeron* such as *E. uniflorus* Linn. ; nevertheless it seems preferable to retain *E. bonariensis* for the time being where it is well known, that is within *Erigeron*, rather than to transfer it to one of these other genera.

Two separate species are commonly passing under the name *Erigeron bonariensis* Linn. (cf. S. F. Blake in Contrib. Gray Herb. N.S.3, No. 52, 27 : 1917). The first of these is familiar to European botanists as a weed of cultivated lands in the Mediterranean region. Probably of Argentine origin, it now occurs in many parts of the world and, though not absent from the tropics, is especially plentiful where the climate is of the Mediterranean type.

The early history of this species is surprisingly straightforward. It was first described by Dillenius (Hort. Elth. 344 : 1732) under the name *Senecio bonariensis purpurascens, foliis imis coronopi*, and we may perhaps infer, from his statement that it came from S. America, that it had not yet become a common Mediterranean weed. Any doubt about the identity of this plant (Dillenius's illustration is scarcely adequate for certainty in such a difficult group) is at once dispelled by reference to the Dillenian specimens at Oxford, which are typical of material from S. America.

Linnaeus (Sp. Pl. 1, 863 : 1753) quoted Dillenius's description and figure under *Erigeron bonariensis* : the specimens in his own herbarium agree very well with the Dillenian plant and the identity of *E. bonariensis* is therefore clear beyond all doubt. It should be added that though the species is enumerated by Linnaeus in Hortus Cliffortianus, there is no specimen of it in the Clifford herbarium now at the British Museum (Natural History).

The second species also appears to be of South American origin, but probably from Brazil. It, too, is now widespread as a weed, but tends to favour more tropical climates than *E. bonariensis*, although both species may be established in some places, for instance in parts of Australia, and then mixed collections may occur. It has not yet been recorded, as far as I am aware, in Europe. This species is *Conyza floribunda* H. B. K. (Nov. Gen. et Sp. **4,** 73 : 1820), which is *Erigeron floribundus* (H. B. K.) Sch. Bip.

A key to the two species and detailed synoymy conclude the paper ; meanwhile a few notes on the commoner synonyms are desirable. Taking these in chronological order the first is *Erigeron crispus* Pourr. [in Mém. Acad. Toul. **3,** 318 (1788) ; Timbal-Lagrave, Reliquae Pourretianae in Bull. Soc. Sc. Phys. Nat. Toulouse, **2,** 127 (1875)]. I have seen no authentic specimen of this species, which Pourret obtained from the south of France, but the description leaves little doubt that it is the true *E. bonariensis* Linn. and thus an early date is set to its introduction as a European weed. In this connexion, however, it may be noted that Linnaeus had already written " Hospitatur ubique, nimis sese multiplicans " some 40 years previously (Hort. Ups. 258 : 1748).

Erigeron sumatrensis Retz. (Obs. Bot. **5,** 28 : 1789) is the most troublesome name of all. Retzius's herbarium is in the Botanical Museum, Lund, but, though the authorities there have kindly made careful search, no specimen of *E. sumatrensis* can be found ; nor is there a specimen at Stockholm where a few of his types are preserved. This name had fallen into disuse, but was revived by Ridley (Journ. Roy. As. Soc. Straits Br. **79,** 90 : 1918 ; and Fl. Malay Penins. **2,** 196 : 1923) for a Malayan plant " allied to *E. linifolius* Willd." and by Merrill (Fl. Pl. Philipp. **3,** 600 : 1923) who uses it to include *E. linifolius*. Unfortunately Retzius's description does not give sufficient positive characters to enable a certain identification with *E. bonariensis* or *E. floribundus* to be made. If its identity with the latter is finally established, then the name has precedence : for the present, however, it is preferable to use *E. floribundus*, which can be accurately typified.

Next in chronological order is *E. linifolius* Willd. (Sp. Pl. **3**. 1955 : 1804). From this date until Ascherson took up *E. crispus* Pourr. (see Verh. Bot. Ver. Brandenburg, **41,** p. xxxviii : 1899), *E. linifolius* Willd. was the usual name for the true *E. bonariensis*. Willdenow, we may assume, believed *E. bonariensis* to be the more tropical plant which we call *E. floribundus*. He had a manuscript name for this species which he never published : it was, however, taken up later by Sprengel, *Conyza albida* Willd. ex Sprengel (Syst Veg. **3,** 514 : 1826), and a fragment in the Kew herbarium shows clearly its identity with *Erigeron floribundus*. Asa Gray took up *Conyza albida* Willd. in preference to *C. floribunda* H. B. K., but its use by Sprengel post-dates *C. floribunda* H. B. K. by some six years.

Meanwhile one further name had been added to the confusion. De Candolle described as *Conyza ambigua* (Fl. Franc. **6,** Suppl. 468 : 1815) a plant which he thought was perhaps *Erigeron linifolius* Willd. De Candolle's description and the fact that the plant is a weed leave little doubt that his suspicion was correct : in other words this was once more true *E. bonariensis*.

The following key will serve to distinguish the normal forms of these two species ; that is to say, the commonly occurring weeds. It should be made clear that I have not attempted to investigate the detailed taxonomy of the group. There are a number of South American forms which require careful study.

Herb up to 4 ft., branched, the lateral branches often overtopping or at least equalling the main axis (cf. *E. acris* L.) ; involucral bracts whitish on the inside ; capitula when pressed commonly 1 cm. or more in diameter ; pappus white or pinkish.

E. bonariensis L.

Herb up to 6 ft., branched, the lateral branches not overtopping the main axis and the whole forming a pyramidal compound inflorescence (cf. *E. canadensis* L.) ; involucral bracts showing chestnut brown on the inside when reflexed on the old capitula ; capitula when pressed commonly less than 1 cm. in diameter ; pappus straw-coloured.

E. floribundus (H. B. K.) Sch. Bip.

Erigeron bonariensis *L.* Sp. Pl. **1,** 863 (1753) ; Dill. Hort. Elth. Add. Denom. Linn. t. 257 (1774) ; S. F. Blake in Contrib. Gray Herb. N.S.**3,** No. 52, 27 (1917) ; Hayward & Druce, Adv. Fl. Tweedside, 94, fig. 25, 26 (1919). *Senecio bonariensis purpurascens, foliis imis coronopi*, Dill. Hort. Elth. 344, t. 257 (1732). *Erigeron foliis inferioribus dentato-laciniatis, superioribus integris*, L. Hort. Cliff. 407 (1737) et Hort. Ups. 258 (1748). *E. crispus* Pourr. in Mém. Acad. Toul. **3,** 318 (1788)—not seen ; Timbal-Lagrave, Reliquae Pourretianae in Bull. Soc. Sc. Phys. Nat. Toulouse, **2,** 127 (1875); Ascherson in Verh. Bot. Ver. Brandenburg, **41,** p. xxxviii (1899); Fiori & Paol. Ic. Fl. Ital. 418 (1904). *E. undulatus* Moench, Meth. 598 (1794). *E. linifolius* Willd. Sp. Pl. **3,** 1955 (1804) ; Reichb. Ic. Fl. Germ. **16,** t. 913 (1853) ; Paolucci, Fl. Marchig. t. 27 (1890) ; F. M. Bailey, Weeds & Poison. Pl. Queensl. 74 (1906) ; Black, Nat. Fl. S. Austr. 82 (1909) ; B. E. C. Rep. 1909, 415 (1910) ; Queensl. Agr. Journ. N. Ser. 4, t. 20 (1915) ; Fyson, Fl. Nilgiri & Pulney Hill-tops, **3,** 378 (1920). *Conyza ambigua* DC. Fl. Franc. **6,** Suppl. 468 (1815) ; Cesati, Passer. & Gibelli, Comp. Fl. Ital. t. 83, fig. 6 (1867-86) ; Cusin & Ansberque, Herb. Fl. Fr. **12,** t. 25 (1873) ; Acloque, Fl. Fr. 353 (1894) ; Coste, Fl. Fr. **2,** 292 (1903) ; Merino, Fl. Galic. **2,** 327 (1906) ; Cadevall & Sallent, Fl. Catalunya, **3,** 217 (1917). *Erigeron ambiguus* (DC.) Sch. Bip. in Berth. & Webb, Phyt. Canar. **3,** sect. 2, 208 (1844)—non Nutt. *Conyzella linifolia* (Willd.) Greene, Fl. Francisc. 386 (1897). *Leptilon bonariense* (L.) Small, Fl. Southeastern U.S. 1231 (1903), quoad nomen tantum, excl. descr. *L. linifolium* (Willd.) Small, Fl. Southeastern U.S. 1231 (1903). *Conyza bonariensis* (L.) Cronquist in Bull. Torr. Bot. Club, **70,** 632 (1943).

Erigeron floribundus (*H. B. K.*) *Sch. Bip.* in Bull. Soc. Bot. France, **12,** 81 (1865), et in Linnaea, **34,** 534 (1865–66). *Conyza floribunda* H. B. K. Nov. Gen. & Sp. **4,** 73 (1820). *Conyza albida* Willd. ex Spreng. Syst. Veg. **3,** 512 (1826). *Erigeron albidus* (Willd. ex Spreng). A. Gray in Proc. Amer. Acad. **5,** 319 (1862). *Erigeron sumatrensis* Retz. sec. Ridley in Journ. Roy. As. Soc. Straits Br. **79,** 90 (1918) et Fl. Malay Penins. 2, 196 (1923) ; Merrill, Fl. Pl. Philipp. **3,** 600 (1923)—dubie Retz. Obs. Bot. **5,** 28 (1789). *Leptilon bonariense* (L.) Small, Fl. Southeastern U.S. 1231 (1903) quoad descr. tantum, excl. nom.

CORRECT NAME OF CORCHORUS ANTICHORUS RAEUSCH.

D. Chatterjee

The name *Corchorus antichorus* has been used for a long time for a species found in the dry and sandy parts of Central and North-West India, Arabia, North Africa and neighbouring territories. The earliest specific name for this plant was *Antichorus depressus* Linn. and therefore the specific epithet *depressus* should be transferred to *Corchorus*, there being no obstacle to its use in this genus, and the name should be *Corchorus depressus*. This combination appears in the *Index Kewensis*, where it is credited to Stocks. Reference to literature, however, shows that Stocks' combination cannot be regarded as valid. In *Proc. Linn. Soc.* **1,** 367 : 1848 (cited by Ind. Kew.) occurs the following passage :—

> " Dr. Stocks refers to Captain Vicary's paper on the plants of Scinde in the Journal of the Asiatic Society of Calcutta for November, 1847, ——. He desires that Captain Vicary's published names of various species may be substituted for his own MS. names and remarks that Captain Vicary's *Aegialitis* is a true *Statice*, [other misidentifications are then pointed out, followed by]——his *Corchorus depressus* is *C. humilis* Munro."

Reference to Vicary's paper cited by Stocks (Journ. As. Soc. Beng. **16,** 1160 : 1847) shows that what Vicary actually wrote was " *Antichorus* (*Corchorus*) *depressus* Linn "., and *not Corchorus depressus* as stated by Stocks ! It is also clearly evident that in accidentally misquoting Vicary's plant as " *Corchorus depressus*", Stocks was not deliberately making a new combination, but was merely pointing out what, in his opinion, was a misidentification. Such an incidental new combination has no standing under the International Rules (see *Brittonia* **6,** 13–14 : 1947). It is therefore necessary to find the first valid publication of this combination. This appears to have been by Christensen in 1922, in his account of Forskal's herbarium, and the correct citation will therefore be **Corchorus depressus** (*Linn.*) *C. Christensen.* Christensen himself ascribed the combination to Stocks, but he probably merely followed the Kew Index or he had not the opportunity of consulting the publication cited above (i.e. *Proc. Linn. Soc.* **1,** 367 : 1848). The synonymy is as follows :—

Corchorus depressus (*Linn.*) *C. Christensen* in Dansk. Bot. Arkiv, **4,** no. 3, 34 (1922) ; Blatter in Journ. Bomb. Nat. Hist. Soc. **34,** 891 (1931).

Antichorus depressus Linn. Mant. 64 (1767) ; Lam. Encycl. **1,** 206 (1783) ; DC. Prodr. **1,** 504 (1824) ; G. Don, Gen. Syst. **1,** 542 (1831) ; Vicary in Journ. As. Soc. Beng. **16,** 1160 (1847).

Jussiaea edulis Forsk. Fl. Aeg. Arab. 210 (1775).

Corchorus Antichorus Raeuschel, Nom. Bot. ed. 3, 158 (1797) ; Anderson in Journ. Linn. Soc. **5,** Suppl. 10 (1860) ; Boiss. Fl. Or. **1,** 846 (1867) ; Oliver, Fl. Trop. Afr. **1,** 263 (1868) ; Masters in Hook. f. Fl. Br. Ind. **1,** 398 (1874) ; Watt, Dict. Econ. Prod. Ind. **2,** 535 (1889) ; Cooke, Fl. Bomb. **1,** 150 (1901) ; Muschler, Man. Fl. Egypt, **1,** 623 (1912) ; Gamble, Fl. Madras 121 (1915) ; Blatter in Rec. Bot. Surv. Ind. **7,** 132 (1915) ; Blatter in Rec. Bot. Surv. Ind. **8,** 90 (1919) ; Schwartz, Fl. Trop. Arab. in Mitteil. Inst. Bot. Hamburg **10,** 155 (1939).

Corchorus prostratus Royle, Illustr. Bot. Himal. 103 (1834), *nomen.* ; Munro considers this species (somewhat doubtfully) as a synonym of his *Corchorus humilis* (Hort. Agrensis 35 : 1844, et Wight, Icon. **3,** pt. 4, 5 : 1848).

Corchorus fruticulosus Visiani, Pl. Aegypt. et Nubiae, 21, et tab. 3, fig. 2 (1836).

Corchorus microphyllus Fresen. in Mus. Senckenb. **2,** 156 (1837).

Corchorus humilis Munro (non St. Hil. 1825) Hort. Agrensis, 35 (1844) ; Wight Icon. 1073 (1846) ; Dalz. et Gibs. Bomb. Fl. 25 (1861) ; Stocks in Proc. Linn. Soc. **1,** 367 (1848). Munro in describing his *Corchorus humilis* appears to have overlooked that the name was used earlier by St. Hilaire for a South American plant in Mart. Fl. Bras. **1,** 280 : 1825).

NEW RECORDS OF PLANTS FROM INDIA, PAKISTAN AND BURMA*

D. Chatterjee.

Fissistigma polyanthum (*Hook. f. et Thoms.*) *Merrill* (*Annonaceae*)

Burma. Myitkyina District, near Htagaw, 9th May, 1938, *C. W. D. Kermode* 17350.

Previously known from Assam.

Fissistigma thorelii (*Pierre ex Finet et Gagnep.*) *Merrill* (*Annonaceae*)

Burma. Mergui District, Leikpok Chaung, 1926, *Braybon's Collector* 2. Previously known from Indo-China. The Burmese plant agrees well with authentic material and with the excellent drawing of this plant published by Finet and Gagnepain (Mem. Bull. Soc. Bot. Fr. **4,** tab. 20A, 1909).

Dichapetalum hainanense (*Hance*) *Engler* (*Dichapetalaceae*)

Burma. Katha District, Mode Reserve, Mansi Division, 13th March 1929. *Sukoe* 9091.

Previously known from Hainan. The Burmese plant differs slightly from the Hainan specimen, but I am convinced that the two represent the same species.

*Continued from Kew Bulletin 1946 ; 49. Unless otherwise stated the sheets referred in this paper are in Herb. Kew.

Tripterygium wilfordii *Hook. f.* (*Celastraceae*)

Burma. Myitkyina District, Htagaw, 23rd May 1929, *Sukoe* 9984.

Previously known from Yunnan to Formosa. Fischer (Kew Bull. 1939, 335) has already pointed out that the plant occurs in Burma. The identification was based on fruiting material (*Naw Mu Pa* 17437). Through the courtesy of the Dehra Dun Herbarium the above flowering sheet (*Sukoe* 9984) of this species has been secured for the Kew Herbarium. Recently the plant was figured in Bot. Mag. 9488 and it appears that it was not known from Burma at that time.

Thevenotia scabra *Boiss.* (*Compositae*)

West Pakistan. Beluchistan, Quetta, East Camp, 9th September, 1942, *J. Sinclair* 2759.

Previously known from Persia and Afghanistan.

Mecardonia dianthera (*Swartz*) *Pennell* (*Scrophulariaceae*)

syn. *Herpestis chamaedryoides* H. B. K.

East Pakistan. Sylhet District, Chatak, *Deka* 13, in Forest Herbarium Shillong (named at Kew during November 1947).

Native of America ; previously known to have become naturalised around Calcutta. Prain says (Beng. Pl. 765, 1903) that this plant first established itself in India in the vicinity of Calcutta about the year 1903. Its discovery as far east as the district of Sylhet shows the extension of its distribution during the last forty-five years. It is not recorded in Kanjilal and Das' *Flora of Assam*. Dr. H. F. Mooney, Forest Adviser Eastern States, informs me that he has also collected this plant in Orissa. I have not however, seen any of his specimens from Orissa.

Briggsia forrestii *Craib* (*Gesneriaceae*)

Burma. Myitkyina District near Kangfang, 15th September 1938, *New Mu Pa* 17463 ; Upper Burma, July 1924, *G. Forrest* 27026 in fruit.

Previously known from Yunnan.

Omphalea bracteata (*Blanco*) *Merrill* (*Euphorbiaceae*)

Burma. Mergui District, Augyi on banks of the river Tenasserim, 14th February 1930, *Sukoe* 53 in Herb. Dehra Dun.

Previously known from the Philippines. A remarkable extension of distribution.

Spodiopogon lacei *Hole* (*Gramineae*)

Assam. Manipur, Litan, 760 m. in open grass land, *N. L. Bor* 18518 in Herb. Dehra Dun.

Previously known from Burma.

Polytrias amaura (Büse) O. Ktze. (*Gramineae*)

Burma. Rangoon, *Thein Lwin* 2.

Previously known from South East Asia (China to Borneo) and Africa.

THE RUSTAM HERBARIUM, 'IRAQ.—Part 1.

Systematic List.

by R. A. Blakelock,

with colloquial names and field notes supplied by E. R. Guest and others.

Introduction.

The collection here dealt with was prepared for the Herbarium of the Rustam Experimental Farm, Department of Agriculture, 'Iraq. It numbers over five thousand specimens and was made by Mr. E. R. Guest, Inspecting Officer of Agriculture, between 1919 and 1933. Some specimens from other correspondents and collectors have been incorporated. A more detailed account of the history of the formation of the Herbarium at Rustam will be found in "Notes on plants and plant products with their colloquial names in 'Iraq", Department of Agriculture, 'Iraq, Bull. 27 (1933).

A duplicate set of the specimens was sent to Kew where many of them were provisionally identified by the late Mr. A. R. Horwood. Unfortunately this work was interrupted in 1937 by Mr. Horwood's death. The collection was subsequently handed over to the present writer. The compiling of this list was again interrupted by the war and has only recently been resumed.

It is intended to publish the systematic list in instalments in the Kew Bulletin. A general and ecological account by Mr. Guest will form the last part of the series, as it must necessarily await the determination of the complete collection.

A register of specimens in the Rustam Herbarium was compiled by Messrs. Guest and Horwood ; a considerable number of these are not represented at Kew and have therefore to be omitted from the present account. Mr. Gillett, now employed as botanist by the Government of 'Iraq, reports that the material in 'Iraq is in good order, but that unfortunately the later numbers (3764–5120) were destroyed during the troubles of 1941.

In certain genera and families the determinations have been made by various specialists, whose aid is acknowledged under the groups with which they were concerned. Acknowledgements to the Directors of various foreign Herbaria for the loan of type specimens are also made under the appropriate species.

The genus *Astragalus* has not been enumerated with the rest of the Leguminosae for the following reason. Many of the specimens were sent to the late Dr. A. Eig, Professor of Botany at the Hebrew University of Jerusalem, and were returned some bearing the names of unpublished new species. It has not been possible for the moment to find out if the descriptions of these species are in the press or not. The treatment of *Astragalus* has been laid aside until further information is available on this point.

The spelling of the 'Iraqi place names has presented certain difficulties, since the names as written on the collectors' labels are not consistent. Reference to various maps, atlases, lists, and handbooks has only added a

further set of variants. The system adopted here therefore is to take one of the variants found on the labels and use it as consistently as possible throughout. The terminal *h* following an *a* with with many Arabic words end is used by some authorities but not by others ; it has here been omitted throughout.

The colloquial names are given as spelt on the labels. No attempts have been made to bring them into line with Mr. Guest's previously published works (Department of Agriculture, 'Iraq, Agric. Leaflet No. 4 (1929) ; Bulletins 26 (1932) and 27 (1933)) ; although some names are given in the published lists which are not on the labels, and some are on the labels which are not in the lists. The spelling in the Arabic script, as well as a discussion of dialect, pronunciation and transliteration should be sought in Guest's publications.

In the following enumeration references to the original place of publication are only given for ranks below that of species, since those for species can be readily found in the Index Kewensis.

The abbreviations used below are mostly those in common use. The following, however, may be explained here, as may vernacular terms used in the field notes—

Collectors' names are given in italics, where not otherwise stated the collector is *E. R. Guest.*

Dates are given in this form, 1.4.33= 1st April 1933 and Apr. 33= April 1933.

(K.)=Kurdish

" daim " unirrigated and cultivated land.

" haswah " high gravel steppe almost desert.

Ranunculaceae

Anemone coronaria *L.*

Diana, near Rowanduz, 26.3.30, 709 ; Amadia (Kurdistan), 1080 m., 26.3.31, 1215, 1215A, 1215B, 1215C ; Amadia, 1080 m., 27.3.31, 2546.

The plants are rather short in stature, and show a wide range of colour in the sepals from dark crimson to white.

Adonis cupanianus *Guss.* ?

Baquba, Apr. 1920, *Paranjpye* 98 ; Dohuk–Mosul, 300–450 m., in cultivated fields, 1.4.31, 1296 ; Mosul, 22.4.31., *Ludlow-Hewitt* 1525 ; Khanzad Valley (nr. Arbil), 420 m., cornfield, 28.4.32, 2005 ; Dohuk, 450 m., in a cornfield on stony soil, 25.4.32, 2318A ; Kirkuk Prov., native name nuruz, 14.5.33, *Ali Effendi Hadari* 3954 ; Ain Ghazal (Mosul Province), 3600 m., in a field, fls. red, 28.4.33, 4080.

The flower size varies considerably in the series of specimens. They are very close to *A. parviflora* Fisch, and *A. persica* Boiss. This group of spp. requires critical revision and examination of type material.

A. microcarpa *DC.*

Khanzad Valley, 17.4.32, 2005A ; Dohuk, 462 m., in a cornfield on stony soil, 25.4.32, 2318 ; Dohuk, native name chavi dikl (K.), 12.5.32, 3280 ; Razinook, Kurdistan (nr. Rowanduz), 900 m., fls. salmon pink, 10.5.33, *Cuckney* 3832 ; Mahad (nr. Shaikhan), native name zakrak (L.), 24.6.32, *Salim Effendi* 2616.

No. 2616 has much shorter styles than in the other specimens.

A. persica *Boiss.*

Nr. Arbil, on top of a " tel", 27.3.30, 628 ; Mosul, 350 m., in cultivated fields, 1.4.31, 1284 ; Arbil, 375 m., in cultivated fields, 2.4.31, 1455, 1456 ; Qcsh Tapa (nr. Arbil), 405 m., in cultivated fields, 2.4.31, 1475 ; nr. Table Mt. (Jabal Hamrin), 60 m., 20.3.32, *Ludlow-Hewitt* 1677 ; Tursak nr. Mandali, at edge of a cornfield, 26.3.32, 1732 ; Jabal Darawishka, on stony land, 29.3.32, 1844 ; Balad Sinjar–Tal Afar, 330 m., on semi-natural steppe, 28.4.33, 4165; Balad Sinjar, 420 m., on roadside grazing strip, 28.4.33, 4100 ; Jazira Desert, 20.4.33, *Edmonds* 3822 ; Ain Ghazal (Mosul Province), 360 m., in a field, fls. yellow, 28.4.33, 4079 ; Ain-al-Husan (nr. Sinjar), 315 m., on open *Poa* steppe, 28.4.33, 4232 ; Makhlat, 180 m., on open *Stipa* steppe, 29.4.33, 4264 ; Southern Desert (between Zubair and Jaliba), in depression on compact sandy soil, 8.4.33, *Guest, Eig and Zohary* 5054.

Ceratocephalus falcatus *Pers.*

Altun Kopri–Gowair, on top of a " tel", March 1930, 382 ; Amadia, 1050 m., common on the mountain slopes, 29.3.31, 1450 ; Balad Sinjar, 390 m., on roadside grazing strip, 28.4.33, 4125 ; Suliman Beg nr. Tuz, 12.4.33, *Guest, Eig and Zohary* 5090.

Delphinium ajacis *L.*

Rustam Garden, Apr. 1930, 247.

D. cappadocicum *Boiss.*

Chia-i-Mandali, 1350 m., in a cultivated field, variegated purple and white, 20.7.32, 2755 ; Zawita, 900 m., on waste land in gardens below village, fls. violet and white, 27.7.33, 3742.

D. flavum *DC.*

Mandali–Kalah, 9.5.30, 787.

The indumentum of this specimen is very much more adpressed than in *Aucher-Eloy* 64 (cited by Boissier), but the flowers are a good match.

D. hybridum *Willd.*

Chia-i-Mandali (nr. Walza), 1950 m., by the edge of a stream, 18.7.32, *Guest and Ludlow-Hewitt* 2691 ; Arl Gird Dagh (nr. Rust), 1950 m., on the mountainside, 24.7.32, 2916.

This plant possesses the lax inflorescence of var. *laxiusculum* Boiss. but the leaf segments are wider and the flowers are blue.

D. kurdicum *Boiss. et Hoh.*

Zawita, 1200 m., in oak forest on steep rocky slope, 28.7.33, 4591.

D. oliverianum *DC.*

Makatu nr. Mandali, May 1930, 875 ; Daltawa, in an onion field, 26.5.32, 2470 ; Kirkuk Province, useful grazing plant, native name turah kurilah, 14.5.33, *Ali Effendi Hadari* 3944.

D. peregrinum *L.* var. **eriocarpum** *Boiss.* Fl. Or. **1,** 87 (1867).

Nr. Ain Sifni (N. of Mosul), 450 m., on stony hillside pastures, purple fls., 11.7.33, 4041.

Eranthis hyemalis (*L.*) *Salisb.*

Ser Amadia, 1800 m., plentiful in wet places on the mountain slope, 28.3.31, 1273.

There appear to be no constant differences between *E. hyemalis* and *E. cilicica*. The characters given by Schott and Kotschy (Oest. Bot. Wochenbl. **4,** 113 (1854)) all " break down " when the whole of the material available is examined.

Nigella arvensis *L.* var. **caudata** *Boiss.* in Fl. Or. **1,** 66 (1867).
Daima nr. Mandali, on stony land, May 1930, 867.

N. sativa *L.*
Rustam, cult. (seed originally from Mosul), native name habbat sodah, 4.6.32, 3419.

Ranunculus arvensis *L.*
Diana, in a millstream, 26.3.30, 718 ; Amadia, 1020 m., in valley orchards, 26.3.31, 1225 ; Dohuk (N. of Mosul), 450 m., in cultivated fields, 1.4.31, 1291 ; Khanzad Valley (nr. Arbil), 420 m., in a cornfield, 17.4.32, 2006 ; Daltawa, in an onion field, native name suffair-al-alaich, 26.5.32, 2473.

R. asiaticus *L.*
Jabal Hamrin, 150 m., on sandy soil, 24.3.31, 1204 ; Dohuk-Mosul 300–462 m., 1.4.31, 1286 ; nr. Kirkuk, on road to Baba Gurgur oil wells, 300 m., 4.4.31, 1356 ; Mosul, 270 m., 2.4.31, 1491 ; Qizil Robat, in a cornfield, 15.4.32, 1963 ; Rowanduz Gorge, 540 m., on the mountain side on a grassy slope, 20.4.32, 2146, 2147 ; Razinook (nr. Rowanduz), 900 m., 10.5.33, *Cuckney* 3830 ; Balad Sinjar, 420 m., on roadside grazing strip, 28.4.33, 4099 ; Balad Sinjar–Tal Afar, 339 m., on semi-natural steppe, 28.4.33, 4163 ; Kani Dolman Hills, Kirkuk, 390 m., on dry stony rounded hilltop, 30.4.33, 4326.

R. brachylobus *Boiss. et Hoh.*
Arl Gird Dagh, 3000 m., by a lake forming a sheet of yellow colour, 22.7.32, *Guest and Ludlow-Hewitt* 2866 ; Arl Gird Dagh, 3600 m., on wet grassy slopes, 22.7.32, 2883.

The leaves in these specimens are more divided than in the type (Kotschy 168), and in some approach those of the closely allied *R. demissus* DC. Our plant agrees well with Bornmüller 828 which was identified by the collector as *R. brachylobus*.

R. cuneatus *Boiss.*
Ser Amadia (Kurdistan), 900–1800 m., common, 23.4.31, *Ludlow-Hewitt* 1523 ; Rowanduz Gorge, c. 750 m., 18.4.32, 2046. In the absence of fruiting material these specimens are only named tentatively.

R. dasycarpus (*Stev.*) *Boiss.*
Zakho Valley, 600 m., 25.4.32, 2257 ; Balad Sinjar, 330 m., on semi-natural steppe, 28.4.33, 4164.

Our plant is very near *R. macrorhynchus* Boiss., but the achenes do not quite agree with Boissier's type-number (Kotschy 271). It is therefore considered to be *R. dasycarpus*, although Herb. Kew contains no authenticated fruiting material of this species, with which it can be compared. This gathering shows both smooth and tuberculated fruits (i.e. both the typical form and var. *leiocarpus* Zohary in Pal. Journ. Bot. ser. 5, **2,** 152 (1941)).

R. heterophyllus *Weber* var. **submersus** (*Gren. et Godr.*) *Bab.* in Man. Brit. Bot. ed 7, 6 (1874).

Daltawa, in ponds and ditches, 23.3.31, 1205.

R. kochii Ledeb. non *R. fasicularis* Barton (§*Ficaria*).

Amadia, 900–1800 m., very common in moist places on the mountain slopes round Amadia and up to Ser Amadia, 28.3.31, 1299 ; Ser Amadia, 1800 m., 30.3.31, 1447 ; Sulaimaniya, 1500 m., on top of hill near snow, 31.3.32, *Ludlow-Hewitt* 1938.

R. lomatocarpus *F. et M.*

Mandali, 9.5.30, 784 ; Amadia, 1050 m., in the stream, 28.3.31, 1226 ; Amadia (Kurdistan), 1050 m., in cultivated fields in the valley, 27.3.31, 1247 : Sharaban, in a marsh, 29.3.32, 1749 ; Qizil Robat, in a stream, 30.3.32, 1891 ; Daltawa, on marshy land, native name suffair-al-alaich, 29.5.32 and 26.5.32, *Guest and Darwish Haidari* 2347 ; Tanjero Valley (Sulaimaniya) on "daim" (unirrigated) and watered land throughout the province, spring plant eaten by all animals, native name gularzarda, 17.4.32, 2406 ; Daltawa, in an onion field, native name suffair-al-alaich, 26.5.32, 2474 ; Barbun (nr. Shaikhan), native name junk (K.), 24.6.32, *Salim Effendi* 2613 ; Dohuk, in a water channel, native name ain-al-bazoon, 26.4.32, *Yussef Lazar* 3322 ; Baghdad in gardens at Rustam, native name ayun-al-bazzun, 27.4.33, *Yussef Lazar* 3882 ; Makhlat, 170 m., among rocks under a cliff, 29.4.33, 4273.

R. millefolius *Banks et Sol.* (*R. myriophyllus* Schrad.)

Bazian Pass, 373 m., 2.4.31, *Ludlow-Hewitt* 1200 ; Dohuk-Mosul, 300–450 m., on dry ground, 1.4.31, 1290 ; Pirmum Pass, 750 m., on top of the pass among oak trees, 17.4.32, 2018 ; nr. Rowanduz, 900 m., 18.4.32, 2044.

R. muricatus *L.*

Baghdad, in a date garden at Karada, 20.2.31, 15.3.31, 1088 ; Baghdad in gardens at Rustam Farm, native name ayun-al-bazzun, 27.4.33, *Yussef Lazar* 3881 ; Makhlat, 180 m., on open *Stipa* steppe, native name ward nisan or shaqaiq-an-numan, 29.4.33, 4248.

R. oxspermus *MB*

Mosul, 270 m., in a low place in a cultivated field, 2.4.31, 1342.

R. paucistamineus *Tausch* (§*Batrachium*).

Daltawa, in marshes, native name hunkrais-al-mai, 26.5.32, 2445.

R. sericeus *Banks et Sol.* (*R. cassius* Boiss.)

Rowanduz Gorge, 750 m., by a stream, 18.4.32, 2089.

R. aff. **trichocarpus** *Boiss. et Ky.*

Arl Gird Dagh, 3000 m., on mountainside, 22.7.32, *Guest and Ludlow-Hewitt* 2867.

This plant cannot be accurately identified in the absence of fruiting material.

Ranunculus sp. (§*Batrachium*).

Suq-as-Shiyukh, in water and wet places, of no value, native name izhar-al-batt, Apr. ?–June ? 32, *Qaimaqam of Suq-as-Shiyukh* 3304.

Very imperfect specimen.

Thalictrum isopyroides *C. A. Mey.*
Marmarut Mt. (Rowanduz Area), 1080 m., on a scree, 19.4.32, 2061.

T. minus *L.* var. **olympicum** *Boiss.* Fl. Or. **1,** 8 (1867).
Arl Gird Dagh, 2300 m., by a stream, 24.7.32, 2933.

The value to be given to varietal determination within the polymorphic species *T. minus* s.l. is quite uncertain. Guest's specimens are in young flower and have narrower inflorescences than most other specimens of the variety at Kew. The leaflets are rather less coriaceous than material from the Balkan Peninsula.

BERBERIDACEAE.

Bongardia chrysogonum (*L.*) *Boiss.*
Diana nr. Rowanduz, 26.3.30, 702 ; Kirkuk, c. 210 m., in cultivated fields, 4.4.31, 1382 ; nr. Arbil, c. 420 m., in cultivated field near Qosh Tapa, native name tarshaukah, 2.3.31, 1477 ; Ser Amadia, 1800 m., 25.4.31, *Ludlow-Hewitt* 1543 ; Marmarut Mt. (Rowanduz area) 900–1200 m., on the stony mountainside, 19.4.32, 2083.

Leontice leontopetalum *L.*
Sulaimaniya, May 1930, *Paterson* 827 ; Daltawa, in cultivated fields, flower yellow, native name dijaij, 6.4.31, 1435 ; Arbil, 360 m., in cultivated fields, 2.3.31, 1463 ; Ain Ghazal (Mosul Province), 360 m., in a field, 28.4.33, 4086.

PAPAVERACEAE.

Glaucium corniculatum *Curt.* var. **flaviflorum** *DC.*? Syst. **2,** 97 (1821).
Jazira Desert, 20.4.33, *Edmonds* 3813.

Material very imperfect.

G. corniculatum (*L.*) *Curt.* var. **phoenicium** (*Crantz*) *DC.* l.c. 96.
Near Kirkuk, 300 m., on the road to Baba Gurgur oil wells in sandy soil, 4.4.31, 1350, 1496 ; Kani Mazi (nr. Khanaqin), 210 m., on dry stony soil at the edge of a cornfield, 29.3.32, 1842 ; Naft Khana, 150 m., on shale banks, a very beautiful flower, delicate scarlet petals with yellowish border, smell most fragrant, 29.3.32, 1859.

G. grandiflorum *Boiss. et Huet.*
Qosh Tapa (nr. Arbil), 415 m., in cultivated fields, native name gulika nisan, 2.4.31, 1481 ; Dohuk, 450 m., in a cornfield on stony soil, 25.4.32, 2288 ; Mosul, in a wheat field, native name shaqaiq, 15.4.32, *Yussef Lazar* 3360; Ain Ghazal (Mosul Province), 360 m., in a field, 28.4.33, 4065 ; Balad Sinjar–Tal Afar, 330 m., on semi-natural steppe, 28.4.33, 4162.

There is a certain variation in the amount of indumentum on the sepals.

Papaver armeniacum (*L.*) *DC.*
Chia-i-Mandali, 1800 m., on stony hillside, fls. salmon pink, 20.7.32, 2767.

P. hybridum *L.*
Ain Ghazal (Mosul Province), 355 m., in a field, 28.4.33, 4063.

P. macrostomum *Boiss. et Huet.*

Qizil Robat, in a cornfield, 15.4.32, 1964 ; Dohuk, 450 m., in a cornfield, 23.4.32, 2312.

Khanaqin, 150 m., on stony hillsides, dry torrent beds, etc., brilliant scarlet flowers, native name shaqaiqan-naman, 29.3.32, 1835.

No. 1835 differs from the typical *P. macrostomum* in the smaller size of the plants, and the relatively broader capsule. It is regarded as a depauperate form and not as a distinct variety. No. 1964 is intermediate between No. 1835 and the typical form.

P. persicum *Lindl.*

Jabal E.N.E. of Seri Hassan Beg, 1950 m., among rocks, 24.7.32, 2902.

P. rhoeas *L.*

Ain Ghazal (Mosul Province), 360 m., in a field, 28.4.33, 4064 ; Balad Sinjar–Tal Afar, 330 m., on roadside strip of waste land, 28.4.33, 4137 ; Ain-al-Husan (nr. Sinjar), 315 m., on open *Poa* steppe, 28.4.33, 4229.

P. rhoeas *L.*

Balad Sinjar, 420 m., on roadside grazing strip, 28.4.33, 4106.

This specimen has a slightly umbonate disc to the capsule but is distinguished from *P. polytrichum* Boiss. et Kotschy by the larger anthers.

P. rhoeas *L* ?

Jazira Desert, 20.4.33, *Edmonds* 3812 : Balad Sinjar–Tal Afar, 330 m., on semi-natural steppe, 28.4.33, 4161 ; Makhlat, 155 m., among rocks under a small cliff, 29.4.33, 4282.

There is no fruiting material of these numbers.

P. rogersii *Exell.*

Kani Mazi (nr. Khanaqin), 215 m., dry stony bed of wadi, brilliant scarlet flowers, 29.5.32, 1863.

P. aff. **P. rogersii** *Exell.*

Kani Dolman hills, Kirkuk, 390 m., on dry stony hills, 30.4.33, 4330.

This plant appears to be intermediate in habit, size, and number of stigmatic rays between *P. rogersii* and *P. glaucum* Boiss. et Hausskn. The peduncles are adpressed hairy as in *P. glaucum*.

Papaver sp.

Kirkuk, 16.4.32, 1989.

A glabrous annual with amplexicaul leaves, distinguished from *P. rogersii* Exell. by the 8–9 stigmatic rays, from *P. decaisnei* by the more deeply cut disc-margin, and from *P. gracile* Auch. by the narrower leaves. A hybrid ?

Roemaria dodecandra (*Forsk.*) *Stapf.*

Ain Ghazal (Mosul Province), 360 m., in a field, 28.4.33, 4061.

The leaf lobes of this plant are very broad, but the capsule is setose, distinguishing it from *R. latiloba* Haussk. et Bornm.

R. hybrida *L.*

Kirkuk, 300 m., in a cultivated field, petals dark purple, drop off very easily, 4.4.31, 1375 ; Dohuk, 450 m., in a cornfield on stony soil,

colour of fl. deep purple, 24.4.31, 2310 : Jazira Desert, 20.4.33, *Edmonds* 3814 ; Ain Ghazal, 360 m., in a field, 28.4.33, 4062 ; Balad Sinjar, 420 m., on roadside grazing strip, 28.4.33, 4107 ; Balad Sinjar–Tal Afar, 330 m., on roadside strip of waste land, 28.4.33, 4136 ; do., on semi-natural steppe, 4160 ; Ain-al-Husan (nr. Sinjar), 315 m., on open *Poa* steppe, 28.4.33, 4228 ; Kani Dolman hills, Kirkuk, 390 m., on dry rounded stony hilltop, 30.4.33, 4331.

FUMARIACEAE

Corydalis caucasica *DC.*

Amadia, 1170 m., in patches of soil between rocks on the cliff face (shady places), 25.3.31, 1206.

C. aff. **C. modesta** *Prain.*

Amadia, 1050, on rocky slopes in a gorge, 27.3.31, 1260 ; do., 10.10.31, 1387 ; Marmarut Mt. (Rowanduz Area), 1500 m., among brushwood by a melting snowdrift, 19.4.32, 2078 ; do., 1200 m., on the stony mountainside, 19.4.32, 2079 ; do., 1050 m., at the foot of a cliff in the shade of the rock, 19.4.32, 2080 ; do., 1200 m., on the stony mountainside, 19.4.32, 2081.

Nos. 1260, 1387 have more obtuse leaflets than in the type number of *C. modesta* (*Aucher-Eloy* 402) in Herb. Kew, but they approach in leaf-shape specimens determined by Fedde as *C. modesta* Prain (*Sintenis* 116, 5452). The remaining numbers have smaller leaf-segments than is usual in *C. modesta.*

C. rutaefolia *DC.*

Ser Amadia, 1800 m., plentiful on the top of the ridge, 30.3.31, 1274.

Fumaria bracteosa *Pomel* (det. Pugsley).

Rustam, 12.3.31, *Yussef Lazar* 1147 ; Kirkuk, 210 m., in a cornfield, 16.4.32, 1988 ; Kaleh Shirwana (N. of Khanaqin), 210 m., 7.3.21, *Ludlow-Hewitt* 2119.

F. indica *Pugsl.* ? (det. Pugsley).

Shimal (Sinjar), in the hills, native name paniruk, Apr. 32, *Mudir of Sinjar* 3134.

" This seems to be a form of *F. indica* Pugsl. but is not typical " (H. W. Pugsley).

F. micrantha *Lag.* (det. Pugsley).

Baghdad (Karada), 22.2.31, 1191 ; Sarchinar nr. Sulaimaniya, 750 m., 30.4.32, *Ludlow-Hewitt* 1929.

F. officinalis *L.* (det. Pugsley).

Amadia (Kurdistan), 1020 m., cultivated fields in the valley under walls, etc., 26.3.31, 1223.

F. parviflora *Lam.* (det. Pugsley).

Rustam. Mar. 1930, 374 ; Baghdad (Karada), 22.2.31, 1191A ; Baghdad, in fields at Rustam, native name shahtaraj, 27.4.33, 3884.

F. parviflora *Lam.* var. **indicoides** *Pugsl.* in Journ. Linn. Soc. **44,** 325 (1919) (det. Pugsley).

Dohuk, 450 m., in cultivated fields, 1.4.31, 1322.

F. parviflora *Lam.* var. **persica** *Pugsl. l.c.* 324 (det. Pugsley).
Baghdad, in an orchard at Karada, colour whitish, 13.4.32, 1995.

Hypecoum pendulum *L.*
Jabal Darawishka (nr. Khanaqin), 240 m., on stony hillside, 28.3.32, 1791 ; Southern Desert (between Zubair and Jaliba), in a depression beneath a *Zizyphus* tree, 8.4.33, *Guest, Eig, & Zohary* 5066 ; Balad Sinjar - Tal Afar, 330 m., on roadside strip of waste land, 28.4.33, 4133 ; Ain-al-Husan (nr. Sinjar), 315 m., on open *Poa* steppe, 28.4.33, 4208.

CRUCIFERAE.

Aethionema campylopterum *Boiss.*
Zakho Pass, 750 m., on the mountainside on loose banks of soil, 25.4.32, 2250.

A. carneum (*Russ.*) *B. Fedtsch.*
Amadia, 1050 m., on mountainsides, 28.3.31, 1271.

A. schizopterum *Boiss. et Haussk.*
Chia-i-Mandali, 2400 m., on the rocky mountainside, 19.7.32, 2791.

The loculi of the silicule are biovulate, not uniovulate as in *A. fimbriatum* Boiss.

Aethionema sp.
Jabal, E.N.E. of Seri Hassan Beg, 1950 m., on the stony mountainside, 24.7.32, 2896.

The silicules resemble those of *A. grandiflorum* Boiss. et Hoh., but the leaves are shorter and broader than in *A. grandiflorum*. The seeds are immature, and do not show whether the cotyledons are incumbent or accumbent, so that the plant may possibly be a species of *Crenularia* Boiss.

Aethionema spp.
Diana, nr. Rowanduz Gorge, 26.3.30, 714 : nr. Amadia, 1932, *Majid Mustafa* 3601.

Material poor and with no ripe fruiting specimens.

Alyssum aff. **fulvescens** *S. et S.* and **macrostylum** *Boiss. et Huet.*
Diana, 26.3.30, 715 ; Amadia, 1140 m., on the mountainside, 28.3.31, 1266, 1276.

No ripe fruit.

A. lanigerum *DC.*
Arl Gird Dagh, 3600 m., among rocks, 22.7.32, 2874 ; Arl Gird Dagh, 2700 m., among rocks, 24.7.32, 2956.

The flowers appear from the dried material to have been white.

A. linifolium *Steph.*
Almost certainly coll. nr. Mosul or Kirkuk, 1930, 625.

A. parviflorum *Fisch ex M. Bieb* (*A. campestre* L.)
Jindian nr. Rowanduz, 25.3.30, 738 ; Amadia, 1140 m., on the mountainside, 28.3.31,1276A ; Dohuk, c. 450 m., in cultivated fields, 14.4.31, 1323 ; Shaqlawa, 900–1050 m., on the hillsides, 17.4.32, 2016 ; Suwara Tuka, 1200 m., 23.4.32, 2218 ; Zakho Valley, 600 m., 25.4.32,

2255 ; Dohuk, on daim land in the hills and valleys, native name gia tivirik (K.), 2.6.32, *Makki Beg* 3254 ; Kani Dolman hills, Kirkuk, 390 m., on dry stony rounded hill top, 30.4.33, 4318.

A. szowitsianum *F. et M.*

Amadia (Kurdistan), 1020 m., in cultivated fields in the valley, 26–27.3.31, 1234, 1249 ; Suwara Tuka, 1200 m., 23.4.32, 2218A.

Alyssum sp.

Arl Gird Dagh, 1800 m., by a stream, 21.7.32, 2818.

The silicules resemble those of *A. lanigerum* DC., but the racemes of the inflorescence are longer and more slender. Probably a form of *A. lanigerum* but not accurately determined in the absence of flowering material.

Alyssum sp.

Almost certainly coll. near Mosul or Kirkuk, 1930, 560 ; Jindian near Rowanduz, 26.3.30, 746A.

Material insufficient for determination.

Anchonium elychrysifolium (*DC.*) *Boiss.*

On tops of Arl Girt, 3660 m., and Siah Koh (Kurdistan), 3564 m., very sweet smelling yellow flowers, Aug. 31, *Ludlow-Hewitt* 1528 ; Chia-i-Mandali (Rowanduz area), Kurdistan, 2700 m., on stony mountainside, fls. yellow very sweet smelling, 19.7.32, *Guest and Ludlow-Hewitt* 2708.

Arabis caucasica *Willd.*

Amadia, 1350 m., on rocky ledges in a gorge near a waterfall, 27.3.31, 1261 ; Arl Girt, 3300 m., white rock plant, Aug. 31, *Ludlow-Hewitt* 1527 ; Arl Gird Dagh, 3000–3300 m., among rocks, 12.7.32, 2877.

Aubrietia parviflora *Boiss.*

Jindian nr. Rowanduz, in a cleft on the face of a cliff, 26.3.30, 727 ; Rowanduz Gorge, 450–750 m., on rocky cliffs, flowers pale mauvish white, 18.4.32, 2109.

Styles rather longer than in type material at Kew.

Barbarea plantaginea *DC.*

Arl Gird Dagh, 3000 m., by a stream, brilliant yellow fls., very sweet smelling, 24.7.32, *Guest and Ludlow-Hewitt* 2808.

Biscutella ciliata *DC.* var. **applanata** *Mach.–Laur.* in Bot. Archiv. **13,** 32 (1926).

Rowanduz, Mar. 30, 728 ; Zawita Gorge, 900 m., on a grassy slope, 23.4.32, 2187.

B. ciliata *DC.* var. ?

Acra, 450–900 m., native name gia dabanjuk (K.), mid.-Apr. 1932, *Qaimaqam of Acra* 3100.

This plant differs from var. *applanata* Mach.-Laur. in the wider silicules with glabrous discs, but does not precisely fit the description of any other variety in Machatschki-Laurich's monograph (Bot. Archiv. **13,** 1–115 (1926)).

Brassica campestris *L.*

Rustam, Mar. 1930, 352 ; Baghdad (Harathiya Estate), weed in wheat fields, 21.2.32, 1162 ; Rustam along a channel, native name fizailak, 7.5.32, *Yussef Lazar* 3429.

B. campestris *L.* var. **rapa** (*L.*) *Hartm.* Handb. Skand. Fl. **6,** 110 (1854).

Rustam, found as a weed in winter crops, also cult. as the turnip, native name shalgham, 26.3.32, *Yussef Lazar* 3427.

Brassica spp. ?

Rowanduz Gorge, 23.3.30, 598 ; Makhlat, 165 m., among rocks under a small cliff, 29.4.33, 4278.

Flowering material only.

Calepina irregularis (*Asso*) *Thell.*

Amadia, 1020 m., in damp places in fields in the valley, 26.3.31, 1228 ; Amadia, 1020 m., in cultivated fields, damp situations, native name qulmah, 27.3.31, 1253.

Capsella bursa-pastoris (*L.*) *Moench.*

Baghdad (at Karada), with *Sisymbrium irio* Mar. 31, 0431A ; Baghdad, 22.2.31, 1109 ; Amadia, 1020 m., in fields in the valley, 26.3.31, 1219 ; Qaraghan, on dry mud flats by the Diyala River, 30.3.32, 1871.

Cardamine hirsuta *L.*

Amadia, 1020 m., cultivated fields, native name qulmah (Assyrian), 27.3.31, 1252.

Cardamine uliginosa *MB.*

Arl Gird Dagh, 2400–2700 m., by streams and in marshy places, fls. almost white, 24.7.32, *Guest and Ludlow-Hewitt* 2946.

Carrichtera annua (*L.*) *Asch. et Schweinf.*

Nr. Felluja, on high gravel land, 6.3.30, 930 ; Altun Kopri-Gowair, Mar. 30, 1019 ; Jabal Hamrin (nr. Injana), 150 m., 6.4.31, 1427 ; Jabal Hamrin (nr. Table Mt.), 150 m., on sandy soil, 28.3.32 and 15.4.32, 1820 ; Jabal Hamrin (nr. Injana), on horizontal sandstone ledges, 12.4.33, *Guest, Eig and Zohary* 5083.

Chorispora purpurascens (*Banks et Sol.*) *Eig* (*C. syriaca* Boiss.)

Syrian Desert (between Jabal Tanf and the Euphrates), Mar.–Apr. 1933, *Edmonds* 3793.

Our plant is rather more hairy than usual.

Chorispora sp. ?

Jabal Hamrin, 21.3.30, 500.

Clypeola aspera (*Grauer*) *Turrill.*

Dohuk, c. 450 m., in cultivated fields on dry gravel soil, 1.4.31, 1324; Kani Dolman hills, Kirkuk, 390 m., on dry stony rounded hill top, 30.4.33, 4317.

C. jonthlaspi *L.* var. 2 *Turrill* in Kew Bull. 7 (1935).

Batas, Kurdistan, 578.

C. lappacea *Boiss.*

Shaqlawa (Kurdistan), 900–1050 m., common on the hillsides, 17,4.32, 2014 ; Rowanduz Gorge, 750 m., 18.4.32, 2108.

Conringia clavata *Boiss.*

Dohuk-Zakho, 450 m., in a cornfield, 24.4.32, 2246.

Didymophysa aucheri *Boiss.*

Arl Gird Dagh, 3300 m., on rocks, 22.7.32, 3050.

Diplotaxis erucoides (*L.*) *DC.*

Rustam, 12.11.30, *Rogers* 853 ; Baghdad, along channels in fields, etc., native name huwairah or fijjailah, 28.2.31, 1081 ; Tuz, 210 m., in cultivated fields, 6.4.31, 1403 ; Daltawa, on channels in cornfields, eaten by animals when young, native name huwairah, 29.4.32, *Darwish Haidari* 2345 ; Rustam, along a channel, fls. yellow, native name qarainah, 7.5.32, *Yussef Lazar* 3428; Kut, on channels, native name fujailah, 15.8.32, *Yussef Lazar* 3483 ; Shaadi (Kut), in a field of sesame, 6.10.32, 3576.

In the dried condition the petals have a more or less pronounced purple lilac flush.

D. harra (*Forsk.*) *Boiss.*

Kifri Gorge, nr. Tuz, 420 ; W. of Mandali, banks of Ab-i-Naqt 9.5.30, 777 ; Jabal Hamrin (nr. Table Mt.), 150 m., on sandy soil on dry rocky ledges, 28.3.32, 1816 ; Naft Khana, 150 m., on stony land, 29.3.32, 1848 ; Kani Mazi (nr. Khanaqin), 150 m., at edge of a cornfield, dry stony ground, 29.3.32, 1861 ; Jazira Desert, 20.4.33, *Edmonds* 3806 ; Kirkuk Province, useful grazing plant, 13.5.33, *Ali Effendi Hadari* 3933 ; Southern Desert (between Zubair and Jaliba), on high very sandy ground strewn with small pebbles in *Haloxylon* association, 8.4.33, 5064.

Draba pulchella *Willd.* (*D. persica* Boiss.).

Arl Girt and Kilashin Pass (Kurdistan), 2700–3300 m., Aug. 1931, *Ludlow-Hewitt* 1529 ; Arl Gird Dagh, 3000 m., by a melting snowdrift, 21.7.32, 2837 ; do., 3000–3300 m., on rocks, 22.7.32, 3062.

Erophila verna (*L.*) *E. Meyer* sensu lato.

Jindian nr. Rowanduz, 25.3.30, 750 ; Qara Tepe, Mar. 1930, 999 ; Amadia, 1200 m., common on grassy mountain slopes, 28.3.31, 1267 ; Marmarut, 1200 m., on stony mountainside, 19.4.32, 2076.

Eruca sativa (*L.*) *Lam.*

Jabal Hamrin, 150 m., Apr. 31, *Ludlow-Hewitt* 1547 ; Baghdad, fields at Rustam, 25.4.33, *Yussef Lazar* 3892.

No fruiting material of No. 1547.

E. sativa (*L.*) *Lam.* var. **eriocarpa** (*Boiss.*) *Post* Fl. Syr. Pal. Sin. ed. 1, 79 (1883–96).

Jabal Qizil Robat, 150 m., on stony hillside, 29.3.32, 1816A ; Jabal Hamrin (nr. Table Mt.), 150 m., on dry rocky ledges on sandy soil, 28.3.32, 1817.

Erucaria bornmuelleri *O. E. Schulz.*
Jazira Desert, 20.4.33, *Edmonds* 3807.

The petals in our plant are tinged with violet towards the base in the dried state.

E. bornmuelleri *O. E. Schulz* var. **liocarpa** *O. E. Schulz* in Engl. Bot. Jahrb. **54,** Beibl. n. 119, 55 (1916).

Jazira Desert, Mar.–Apr. 33, 3804.
The fruit are rather young, and there is some doubt in the determination.

E. cakiloidea (*DC.*) *O. E. Schulz.*
Tuz, 29.3.30, 667 ; nr. Kirkuk, 300 m., on the road to Baba Gurgur oil wells in sandy soil, 4.4.31, 1359 ; Jabal Hamrin (nr. Table Mt.), 150 m., on sandy soil, 28.3.32, 1784 ; Ghurfa Plain (nr. Injana), on sandy soil, 12.4.33, *Guest, Eig and Zohary* 5077.

E. hispanica (*L.*) *Druce.*
Komah Sang, nr. Mandali, 300 m., on barren stony hillsides, native name rishshad-aj-jabal, 26.3.32, 1747 ; Jabal Darawishka (nr. Khanaqin), 240 m., on stony hillsides, 28.3.32, 1756 ; Kirkuk Province, grazed by animals, May 33, *Ali Effendi* 3857.

Erysimum nasturtoides *Boiss. et Haussk.*
Arl Gird Dagh, 3000 m., on the stony hillside, sweet smelling, 21.7.32, 3046 ; do., 3000–3300 m., on rocks, 22.7.32, 3061.

E. persepolitanum *Boiss.* ?
Marmarut Mt. (nr. Rowanduz), 1050 m., on the stony mountain side, 19.4.32, 2082.

No fruiting material.

E. repandum *L.*
Diana, 26.3.30, 719 ; Shaqlawa, 900 m., on the hillside, 17.4.32, 2017 ; nr. Zawita, 750 m., on a water channel, 24.4.32, 2210.

Euclidium syriacum (*L.*) *R. Br.*
Shimal (Sinjar), native name khirul (K.), Apr. 32, *Mudir of Shimal* 3135.

Fibigia macroptera (*Kotschy*) *Boiss.* var. **microcarpa** *Boiss.* Fl. Or. Suppl. 48 (1888).

Chia-i-Mandali, 1800 m., on the stony hillside, 18.7.32, 2655 ; Zawita range, 1050 m., rocky mountain slope, 25.7.33, 4463.

E. suffruticosa Sweet.
Chia-i-Mandali, 2400 m., on the rocky hillside, fls. dark red, 19.7.32, 2793.

Fibigia sp.
Amadia, c. 1200 m., on a rocky cliff near the waterfall gorge, 26.3.31, 1232 ; do., 1500 m., 24.4.31, *Ludlow-Hewitt* 1522.

The plant is either *F. clypeata* (L.) Medik or *F. macroptera* (Kotschy) Boiss., but fruiting material is necessary.

Hesperis aladabadensis *Stapf.*
Marmarut Mt. (nr. Rowanduz), 1200 m., on stony mountainside, 19.4.32, 2085.

Hesperis sp.
Jabel Rus (nr. Gilli), Zakho, fodder plant grazed by sheep, native name qachmuk, 14.5.32, *Mudir of Gilli* 3150.

Material insufficient.

Hirschfeldia incana (L.) *Lagreze-Fossat.*
Jabal Darawishka (nr. Khanaqin), 240 m., on stony hillside, 28.3.32, 1800 ; Makhlat, 180 m., open *Stipa* steppe, 29.4.33, 4239.

Iberis odorata *L.*
Dohuk, 450 m., in a cultivated field on dry gravel soil, 1.4.31, 1306 ; nr. Arbil (Qosh Tapa), 405 m., in cultivated fields, 2.4.31, 1472 ; Zakho-Dohuk, 450 m., in a cornfield, 24.4.32, 2237 ; Zakho Valley, 600 m., 25.4.32, 2258 ; Mosul, in a wheat field, native name jarri, 9.4.32, *Yussef Lazar* 3327 ; Arbil Province, grazed by animals, native name kashfat-al-ajuz, May 1933, *Mhd. al Radhi* 3861 ; Ain Ghazal (Mosul Province), 360 m., in a field, 28.4.33, 4071 ; Kani Dolman hills, Kirkuk, 390 m., on dry stony rounded hilltop, 30.4.33, 4319.

Isatis aleppica *Scop.*
Kirkuk, 22.3.30, 548 ; Qosh Tapa (nr. Arbil), 405 m., in cultivated fields, 2.4.31, 1469 ; Zawita Gorge, 900 m., 23.4.32, 2638 ; Acra, 450–900 m?, native name rishiluk, fodder plant, Apr. 32, *Qaimaqam of Acra* 3094 ; Arbil Province, grazed by animals, native name dhail-al-hussain, May 1933, *Mhd. al Radhi* 3867 ; Ain Ghazal (Mosul Province), 360 m., in a field, 28.4.33, 4090.

I. glabrisiliqua *Blakelock* in Kew Bull. 187 (1939). (Fig. IF, p.415).
Rowanduz Gorge, 450 m., on ledges on rocky cliffs on the gorge sides, large bushy plant, 20.4.32, 2144 (type).

I. guestii *Blakelock* in Kew Bull. 186 (1939). (Fig. IE, p.415).
Dohuk Gorge, 450 m., on a rocky cliff, 21.4.32, 2171 (type).

Lepidium aucheri *Boiss.*
Nr. Mahmudiya, Latifiya Estate, 16.5.32, 2389 ; Baghdad, in fields at Rustam, native name rashshad-al-barriyah, 25.4.33, *Yussef Lazar* 3906.

L. draba *L.*
Baghdad, July 1929, 187 ; Rustam, along channels, in fields, etc., native name qinaibrah, 22.2.31, 1080 ; Rowanduz Gorge, 750 m., on loose stony soil on the mountainside, 18.4.32, 2106 ; Rustam, along channels, etc., 7.5.32, *Yussef Lazar* 3433.

L. ruderale *L.*
Diwaniya (Hor-ad-dukhn), on irrigated land, fodder plant eaten by sheep and goats, native name rashshad, 14.4.32, *Sirkal Mhd. Ali* 2368.

L. sativum *L.*
Nasiriya, in irrigated fields and gardens, eaten by all livestock, native name rishad bastatin, 18.4.32, *Abd-ar-rizaq Barbuti* 2537.

Leptaleum filifolium *DC.*

Southern Desert, W. of Zubair, on compact sandy soil, covered by small stones and grit, 8.4.33, *Guest, Eig and Zohary* 5034.

Malcolmia africana (*L.*) *R. Br.*

Baghdad, Felluja (Abu Ghuraib area), Mar. 1930, 368 ; Jindian, nr. Rowanduz, 25.3.30, 746B ; Baghdad, on sandy banks of the Tigris (at Karada), 16.3.31, 1123 ; Baghdad, along channels in Hinaidi cantonment, 30.3.31, *Yussef Lazar* 1157 ; Baghdad, in depression on Hinaidi aerodrome, native name khuzaimah, 17.3.33, *Yussef Lazar* 3918.

No. 1123 includes two plants of var. *intermedia* (C. A. M.) Boiss.

M. bungei *Boiss.*

Jabal Hamrin (nr. Injana), 150 m., on sandy soil, 6.4.31, 1429 ; do. (nr. Table Mt.), 150 m., on sandy soil on rocky ledges, 28.3.32, 1796 ; Jazira Desert, 20.4.33, *Edmonds* 3808 ; Southern Desert (between Zubair and Jaliba), high sandy soil strewn with small pebbles in *Haloxylon* association, 8.4.33, *Guest, Eig and Zohary* 5059.

These are very close to var. *assyriaca*, especially 3808, differing mainly in the shorter petals.

M. bungei *Boiss.* var. **assyriaca** *Bornm.* in Beih. Bot. Centralbl. **28,** 108 (1911).

Jabal Hamrin (nr. Injana), on sandy soil, 12.4.31, *Guest, Eig and Zohary* 5087.

This matches Bornmüller's type number, and shows the slightly thicker leaves mentioned by Handel-Mazetti (Ann. K. K. Nat. Hosmus. **27,** 50 (1913)).

M. crenulata (*DC.*) *Boiss.*

Bazian Pass (Kurdistan), 375 m., 1.4.32, *Ludlow-Hewitt* 1197 ; Mosul, very common in cultivated fields, 270 m., primrose red fls., 1.4.31, 1282 ; Dohuk, 450 m., in a cornfield on stony land, 21.4.32, 2155 ; nr. Tauq, on flat hillock top, compact soil with few stones, 12.4.4.33, *Guest, Eig and Zohary* 5092.

M. exacoides (*DC.*) *Spreng.* (*M. conringioides* Boiss).

Dohuk, 450 m., in cultivated fields, gravel soil, rich yellow fls., 1.4.31, 1293, 1216 ; Dohuk-Zakho, 450 m., in a cornfield, fl. pale primrose yellow, 24.4.32, 2239 ; Makhlat, 180 m., on open *Stipa* steppe, 29.4.33, 4251 ; Kani Dolman hills, Kirkuk, 390 m., on dry stony round hill top, 30.4.33, 4308.

De Candolle (Syst. **2**, 463 (1821)) describes *Sisymbrium exacoides* as " herba glabra, minima, vix pollicum longa, habitu Exacum pusillum referens . . . . . Folia radicalia obovata, basi attenuata, 3 lin. longa". Guest's material is 3–6 in. tall and the radical leaves are oblong. As there is material in the Kew Herbarium from Palestine and Syria which agrees well with Guest's and shows intermediates to the dwarf form, this is not regarded as a separate geographical race.

M. maritima (*L.*) *R. Br.*

Rustam, in an orchard, red fls., 13.3.32, *Yussef Lazar* 3318.

Possibly a garden escape.

M. torulosa (*Desf.*) *Boiss.*

N. of Daltawa to Jabal Hamrin, on high gypsum steppe, 21.3.30, 526 ; Fatta Gorge, Mar. 1930, 1029 ; Ain Ghazal (Mosul Province), 360 m., in a field, 28.4.33, 4093 ; Balad Sinjar, 429 m., on roadside strip of grazing, 28.4.33, 4111 ; Balad Sinjar– Tal Afar, 330 m., on roadside strip of waste land, 28.4.33, 4134.

No. 4134 has less hairy siliquas than the others but cannot be put into var. *leiocarpa*, as it is not entirely glabrous.

M. torulosa (*Desf.*) *Boiss.* var. **leiocarpa** *Boiss.* Fl. Or. **1,** 225 (1867).

Southern Desert, W. of Zubair, on compact sandy soil covered by small stones and grit, 8.4.33, *Guest, Eig and Zohary* 5035.

M. torulosa (*Desf.*) *Boiss.* ?

Shargat, Mar. 1930, 426.

Material too young.

Malcomia sp. ?

Nr. Felluja, on "haswah", i.e. high gravel steppe almost desert, minute crucifer, fls. white, pinkish or blueish, native name hassar, 6.3.30. 930.

Material too young for accurate determination, possibly a depauperate form.

Matthiola oxyceras *DC.*

Jindian, nr. Rowanduz, 25.3.30, 746 ; nr. Kirkuk, 300 m., on the road to Baba Gurgur oil wells, in loose sandy soil, 4.4.41, 1358 ; Tuz, 210 m., in cultivated fields, 6.4.31, 1388 ; Jabal Hamrin (nr. Table Mt.), 150 m., on sandy soil, 28.3.32, 1795 ; Qaraghan, at the edge of a cornfield (dry situation), 30.3.32, 1881 ; Syrian Desert (between Jabal Tanf and the Euphrates), Mar.–Apr. 33, *Edmonds* 3787 ; Balad Sinjar, 390 m., on roadside grazing strip, 28.4.33, 4122 ; Ain-al-Husan (nr. Sinjar), 315 m., on open *Poa* steppe, 28.4.33, 4235 ; Makhlat, 180 m., on open *Stipa* steppe, native name fijjail, 29.4.33, 4240.

M. oxyceras *DC.* var. **forcipifera** *Boiss.* Fl. Or. **1,** 156 (1867).

Southern Desert, W. of Zubair, on compact sandy soil covered by small stones and grit, 8.4.33, *Guest, Eig and Zohary* 5033.

Nasturtium officinale *R. Br.*

Diana nr. Rowanduz, in a millstrean, 26.3.30, 724 ; Amadia, 1020 m., in millstreams, etc., native name kuzakuz, 27.3.31, 1257; Amara, on mud flats, native name kobani, 13.12.31, 1623 ; Dohuk, in a water channel, native name karainah, 26.4.32, *Yussef Lazar* 3401.

Parlatoria cakiloidea *Boiss.*

Marmarut Mt., 1200 m., on a scree, 19.4.32, 2071.

The inflorescence and very young fruits have a rather better developed indumentum than the rest of the material at Kew.

Physoptychis gnaphalodes (*DC.*) *Boiss.*

Arl Girt (Kurdistan), 300–3600 m., a fine rock plant, growing in clefts in the rock, brilliant yellow, Aug. 31, *Ludlow-Hewitt* 1506 ; Chia-i-Mandali, 2400–2700 m., on rocky mountain side, fls. brilliant yellow, 19.7.32, *Guest and Ludlow-Hewitt* 2721 ; Arl Gird Dagh, 3300 m., on rocky

mountainside, 21.7.32, *Guest and Ludlow-Hewitt* 2888 ; Arl Gird Dagh, 3600 m., on rocks, rock plant with fine yellow flowers, very sweet smelling, 21.7.33, 3053.

Raphanus aucheri *Boiss.*

Kani Dolman hills, Kirkuk, 390 m., on dry stony rounded hill top, 30.4.33, 4356.

No. 760 (nr. Mandali, banks of Ab-i-Naqt River, 9.5.30) is possibly *R. aucheri*, although the pods are more irregular in shape.

R. sativus *L.*

Rustam (cultivated), native name fijailah, 29.3.32, *Yussef Lazar* 3424.

Savigna parviflora (*Del.*) *Webb.*

Southern desert (between Zubair and Jaliba), on high very sandy soil strewn with small pebbles on surface, *Haloxylon* association, 8.4.33, *Guest, Eig and Zohary* 5060.

Schimpera arabica *Hochst. et Steud.*

Jabal Hamrin, nr. Injana, 29.3.30. 674.

S. arabica *Hochst. et Steud.* var. **lasiocarpa** *Boiss.* Fl. Or. **1,** 384 (1867).

Jaliba (nr. Suq-as-Shiyukh), on sandy soil with small grit on surface, 8.4.33, *Guest, Eig and Zohary* 5074.

Sinapis alba *L.*

Rustam, Apr. 30, 238.

S. arvensis *L.*

Basra, Oct. 29, 291 ; Diana, nr. Rowanduz, 26.3.30, 703 ; Arbil, in cultivated fields, 2.4.31, 1466.

Nos. 703 and 1466 are young material and identification is not quite certain.

S. arvensis *L.* var. **orientalis** (L.) *Koch et Ziz* Catal. Pl. Palat. 12 (1814).

Dohuk, 450 m., in a cultivated field, 1.4.31, 1311 ; nr. Kirkuk, 300 m., on the road to Baba Gurgur oil wells, 4.4.31, 1495 ; Jabal Darawishka (nr. Khanaqin), 240 m., on stony hillside, 28.3.32, 1754 ; Mandali, in a cornfield, native name fijailah or khardalah (K.), 26.3.32, 1806 ; Sulaimaniya on " daim " (unirrigated) land especially among wheat, spring plant eaten by all animals, native name khartal, 10.4.32, *Gowan* 2409 ; Balad Sinjar—Tal Afar, 330 m., semi-natural steppe, 28.4.33, 4152.

Nos. 1754, 4152 are dwarfed plants having the habit of *S. aucheri* (Boiss.) O. E. Schulz.

Sisymbrium altissimum *L.*

Daltawa, 21.3.30, 529 ; nr. Arbil, 27.3.30. 622.

S. irio *L.*

Rustam, common weed, Mar. 1930, 362 ; Baghdad (at Karada), Mar. 1931, 0431A ; Rustam, 15.2.31, 1082 ; Baghdad, in grassy patches of a thicket of Euphrates poplar at Karada, Feb. 31, 1103; Baghdad, in undergrowth of a low thicket along the river bank, native name huwairah, 13.4.32, 1103B ; Rustam, at edge of grassy thicket, 11.4.32, 3312.

S. loeselii *L.*

Chia-i-Mandali (nr. Walza), 1950 m., on the hillside, 18.7.32, 2684 ; Chia-i-Mandali (nr. Walza), 2250 m., by a stream, 20.7.32, 2730 ; Arl Gird Dagh (nr. Nawanda), 1800 m., by a stream, 21.7.32, 2811.

Fruits are shorter than usual.

S. septulatum *DC.*

Daltawa, 21.3.30, 529 ; nr. Arbil, 27.3.30, 622 ; Arbil, 373 m., in cultivated fields, 2.4.31, 1462 ; Jazira Desert, 20.4.33, *Edmonds* 3805 ; Ain Ghazal (Mosul Province), 360 m., in a field, 28.4.33, 4092 ; Balad Sinjar, 420 m., on roadside grazing strip, 28.4.33, 4105 ; Balad Sinjar–Tal Afar, 330 m., on roadside strip of waste land, 28.4.33, 4135.

There is considerable variation in leaf-cutting.

S. sophia *L.*

Zawita, 900 m., in gardens below village, seeds used for flavouring bread, native name shamfatuk, July 33 (cultivated Kew 19.7.34), 4537.

S. runcinatum *Lag.*

Nr. Felluja, on " haswah " land, native name hassar, 6.3.30, 970A ; Rustam, along a channel, native name huwairlah, 7.5.32, *Yussef Lazar* 3437.

S. runcinatum *Lag.* var. **hirsutum** (*Lag.*) *Coss.* Not. Pl. Crit. 95 (1851).

Nr. Felluja on " haswah " land, native name hassar, 6.3.30, 970 ; Baghdad, in fields at Rustam, native name huwairlah, 25.4.33, *Yussef Lazar* 3891.

S. tetracmoides *Boiss. et Hausskn.*

Nr. Kirkuk, 300 m., on the road to Baba Gurgur oil-wells, in sandy soil, 4.4.31, 1364 ; Balad Sinjar–Tal Afar, 330 m., semi-natural steppe, 28.4.33, 4151 ; Baba Gurgur (nr. Kirkuk), 315 m., on light alluvial soil, 16.4.33, *Guest, Eig and Zohary* 5102.

Sisymbrium sp.

Rustam, 9.2.31, 1079.

Material insufficient.

Sterigmostemum sulphureum (*Banks et Sol.*) *Bornm.*

Mosul, 270 m., in cultivated fields, 2.4.31, 1335 ; Kirkuk, in cultivated fields, 2.4.31, 1493 ; Arbil, 360 m., in cornfields on stony soil, 22.4.32, 2169 ; Mahad (nr. Shaikhan), on flat " daim " land, fodder plant, native name damar tutun, 23.6.32, *Salim Effendi* 2612.

Tetrapterygium stylophora *Jaub. et Spach.*

Rowanduz Gorge, 450–750 m., on the mountainside, 18.4.32, 2093.

Texiera glastifolia (*DC.*) *Jaub. et Spach.*

Arbil, 375 m., very common in cultivated fields, 2.4.31, 1464 ; Mosul, 270 m., in cultivated fields, 2.4.31, 1489 ; Ain Ghazal (Mosul Province), 360 m., in cultivated fields, 28.4.33, 4057 (cultivated from seed at Kew, June 1934).

Thlaspi perfoliatum *L.*

Nr. Khasm Ahrar, Jabal Hamrin, 21.3.30, 500B ; Rowanduz Gorge, 26.3.30, 599; Amadia (Kurdistan), 900–1200 m., very common on

mountainsides, 25.3.31, 1300 ; Dohuk, c. 450 m., in cultivated fields on dry gravel soil, 1.4.31, 1326 ; Kani Dolman hills, Kirkuk, 390 m., on dry stony rounded hill tops, 30.4.33, 4316.

Thlaspi spp. ?

Rowanduz Gorge, 750 m., 18.4.32, 2103 ; Arl Gird Dagh, 3000 m., on the rocky mountainside, 22.7.32, 2870.

Material very young.

Vogelia apiculata (*F. M. et Avé Lall*) *Vierh.*

Dohuk, 450 m., in a cultivated field, very common in cultivated fields from Mosul to Kirkuk, 1.4.31, 1310.

Crucifer sp.

Nr. Kirkuk, Mar. 30, 407.

No fruiting material.

Capparidaceae

Capparis cartilaginea *Dcne.* (*C. galeata* Fres.)

In the Jazira, in open gypsum desert, a trailing form of caper, native name kabar, 15.10.32, 3521.

This specimen possess no flowers, but the leaves are thick and coriaceous as in *C. cartilaginea.*

C. spinosa *L.*

Kut, Sept. 29, 217 ; Rowanduz Gorge (Kurdistan), 600 m., growing between rocks on a cliff face, 1596 ; Atrush (N. of Mosul), Kurdistan, 817 m., on limestone cliff, 12.7.33, 3623.

Cleome arabica *L.*

Mahmudiya (nr. Baghdad), 22.10.31, 478.

C. kotschyana *Boiss.*

Naft Khana, 150 m., dwarf shrub, on stony hillside, 29.3.32, 1847 ; Baba Gurgur, nr. Kirkuk, 360 m., 1.5.33, 4381.

Cleome sp.

Jabal Hamrin, nr. Injana, 29.3.30, 695 ; nr. Kirkuk, 300 m., on the road to Baba Gurgur oil wells in loose sandy soil, 4.4.31, 1368 ; Jabal Hamrin, nr. Injana, 150 m., 6.4.31, 1432 ; Jabal Darawishka (nr. Khanaqin), 246 m., on stony hillside, 28.3.32, 1760 ; Jabal Hamrin (nr. Injana), on sandy soil with pebbles on surface, 12.4.33, *Guest, Eig and Zohary* 5084.

These plants are near *C. glaucescens* DC. or *C. kotschyana* Boiss. but cannot be identified in the absence of ripe seed. The petals are slightly larger than in *C. kotschyana* (except No. 695).

Resedaceae

Oligomeris subulata (*Del.*) *Boiss.*

Southern Desert, W. of Zubair, 8.4.33, *Guest, Eig and Zohary* 5042 ; Chuwaiba Wells, nr. Zubair, on sandy soil, in a small depression, 8.4.33, *Guest, Eig and Zohary* 5053.

Reseda arabica *L.*

Kowait, 20.3.32, *Mrs. H. Young* 1691 ; Southern desert, W. of Zubair, on compact sandy soil covered by small stones and grit, 8.4.33, *Guest, Eig and Zohary* 5024.

R. aucheri *Boiss.*

Mandali, 9.5.30, 796.

R. bracteata *Boiss.*

Nr. Kirkuk, on the road to Baba Gurgur oil wells, 300 m., 4.4.31, 1372 ; Kirkuk, 210 m., in cultivated fields, 4.4.31, 1383 ; Jabal Hamrin (nr. Table Mt.), 150 m., on sandy ledges, 28.3.32, 1812 ; Naft Khana, 150 m., on stony soil, 29.3.32, 1851 ; Al Qosh, N. of Mosul, 600 m., in a rocky ravine below Raban Hormuz monastery, 15.7.33, 3682 ; Ghurfa Plain (nr. Injana), on gypsiferous soil, 12.3.33, *Guest, Eig and Zohary* 5081.

R. decursiva *Forsk.*

Mosul, 270 m., 2.4.31, 1333 ; Mosul, 270 m., in cultivated field on the old rampart of Nineveh, 2.4.31, 1345 ; Qaraghan, on stony ground, 30.3.32, 1872 ; Nineveh (Mosul), on the hill, 15.4.32, *Yussef Lazar* 3392A ; Makhlat, 180 m., on open *Stipa* steppe, 29.4.33, 4265.

R. lutea *L.*

Mosul, 270 m., in cultivated fields, 2.4.31, 1336 ; Qosh Tapa (nr. Arbil), 405 m., 4.4.31, 1473 ; Dohuk, 450 m., in cornfields, 24.4.32, 2290 ; Mosul in a wheat field, 9.4.32, *Yussef Lazar* 3392 ; Balad Sinjar, 420 m., on roadside grazing strip, 28.4.33, 4104.

R. odorata *L.*

Baghdad, in gardens at Rustam, 13.5.33, *Yussef Lazar* 3925.

Reseda sp.

Zawita, 1020 m., on rocky cliff near village, 30.7.33, 4841.

This is probably *R. lutea* L., but the plant is more glaucescent, the inflorescences shorter and the capsules more globose, than in most of the Oriental material.

Cistaceae

Fumana arabica (*L.*) *Spach.*

Shaqlawa, on the mountainside, May 30, *Paterson* 835 ; Zawita Gorge, 900 m., on rocky ledges above the gorge, 23.4.32, 2196 ; Atrush (N. of Mosul), 900 m., in pine area on red mark banks, fls. orange-yellow, 13.7.33, 3651 ; Jabal Rubal, S. of Atrush, N. of Mosul, 750 m., in oak forest on rocky limestone slope, fls. yellowish-orange, 14.7.33, 3657 ; Zawita Valley, 930 m., among limestone crags, 25.7.33, 4446 ; Zawita Gorge, 780 m., on limestone rocks, 26.7.33, 4466 ; Zawita, 1170 m., among clump of pines by outcrop of flat limestone terraces, 28.7.33, 4561.

Helianthemum aegypticum (*L.*) *Mill.*

Tekrit, Feb. 30, 392 ; Tuz, 210 m., on the barren grassy roadside, 4.4.31, 1318 ; Arbil, 375 m., in cultivated fields, 2.4.31, 1476 ; Balad Sinjar–Tal Afar, 330 m., on roadside strip of waste land, 28.4.33, 4148 ; do., on semi-natural steppe, 4174 ; Makhlat, 180 m., on open *Stipa*

steppe, native name jaraidi or jaraid-ach-chemah, 185 m., 29.4.33, 4253 ; Kani Dolman hills, Kirkuk, 390 m., on dry stony rounded hilltop, 30.4.33, 4321.

H. ledifolium (*L.*) *Mill.*

Dohuk, 450 m., in a cornfield on stony soil, 25.4.32, 2319 ; Chuwaiba Wells, nr. Zubair, on sandy soil in slight depression, 8.4.33, *Guest, Eig and Zohary* 5046 ; Tal Afar, 375 m., in a field on hard but friable soil, 26.4.33, *do.* 5115.

H. ledifolium (*L.*) *Mill.* var. **lasiocarpum** (*Desf.*) *Boiss.* in Fl. Or. **1,** 441 (1867).

Almost certainly coll. near Mosul or Kirkuk, 148 ; Dohuk, native name gia khaskhashuk (K.), 8.5.32, *Makki Beg* 3268.

H. lippii (*L.*) *Dum.-Cours.*

Jabal Hamrin (nr. Table Mt.), on sandy soil, 16.4.32, 1823 ; do., 28.3.32, 1823A ; Southern desert, W. of Zubair, on compact sandy soil covered by small stones and grit, 8.4.33, *Eig, Guest and Zohary* 5031.

No. 1823A has considerably smaller flowers than the other two specimens, but as this variety shows some range in flower size it is included here.

H. salicifolium (*L.*) *Mill.*

Nr. Felluja on " haswah " land, 6.3.30, 957 ; do., on land once cultivated, 6.3.30, 988 ; Dohuk, 450 m., in cultivated fields, dry gravel soil, 1.4.31, 1315 ; Tuz, 210 m., in cultivated fields, 6.4.31, 1396 ; Arbil, 375 m., in cultivated fields, 4.4.31, 1458 ; nr. Rowanduz, 769 m., on dry hillside, 18.4.32, 2047 ; Zakho Valley, 600 m., 25.4.32, 2256 ; Dohuk, 450 m., in a cornfield on stony soil, 25.4.32, 2319 ; Balad Sinjar–Tal Afar, 330 m., on semi-natural steppe, 28.4.33, 4175 ; Ain-al-Hussan (nr. Sinjar), 315 m., on open *Poa* steppe, 28.4.33, 4197 ; Makhlat, 180 m., on open *Stipa* steppe, native name jaraidi or jaraid-ach-chimah, 29.4.33, 4252 ; Kani Dolman hill, Kirkuk, 390 m., on dry stony rounded hilltop, 30.4.33, 4322.

Violaceae

Viola alba *Boiss.*

Amadia, Kurdistan, 1050 m., common under damp walls in orchards etc., fls. white, 28.3.31, 1258.

Viola modesta *Fenzl.*

Amadia, 1050 m., among rocks on the mountainside, 28.3.31, 1270.

Viola odorata *L.*

Amadia, 1050 m., common under damp walls in orchards, etc., fls. violet, 28.3.31, 1259.

Frankeniaceae

Frankenia aucheri *Jaub. et Spach.*

Mandali, 9.5.30, 786 ; in the Jazira (nr. Wadi Tharthar), on the banks of a wadi (probably saline soil), native name shuwaiwah, 15.10.32, 3555.

CAROPHYLLACEAE

Acanthophyllum crassifolium *Boiss.*

Chia-i-Mandali (nr. Walza), 1500–1800 m., on the rocky hillside, forming low, flat, spiny, tufted cushions, 18.7.32, 2653.

Ankyropetalum gypsophiloides *Fenzl* var. **glandulosum** (*Boiss. et Hausskn.*) *Bornm.* in Beih. Bot. Centralbl. **28,** II, 136 (1911).

Atrush, N. of Mosul, 795 m., base of limestone cliff, 12.7.33, 3620 ; nr. Altun Kopri on Zab River, on hills of Bakhtiari conglomerate, 8.7.33, 4022.

Boissier (Fl. Or. **1,** 533) describes *A. gypsophiloides* as " glabrum," but in Fenzl's description (Bot. Zeit. **1,** 393 (1843)) it is given as "glaucum glaberrimum v. glanduloso-pubescens". Some of the specimens cited by Boissier (e.g. *Kotschy* 356, *Aucher-Eloy* 552) are hairy. No. 3620 is more densely hairy especially in the upper parts than Bornmüller's type number of var. *glandulosum* in Herb. Kew, while No. 4022 matches it very well in degree of hairiness.

Buffonia oliveriana *Ser.*

Jabal E.N.E. of Seri Hassan Beg, 1950 m., on the stony mountainside, 24.7.32, 2922.

Cerastium anomalum *W. K.*

Amadia, 1020 m., under trees in orchards in the valley, 26.3.31, 1228 ; Amadia, 1020 m., in cultivated fields, in damp places under stone walls, etc., 27.3.31, 1255.

C. cerastoides (*L.*) *Britt.* (*C. trigynum* Vill).

Arl Gird Dagh, 3300 m., 22.7.32, 3074 ; do., 3000–3300 m., in wet places, 22.7.32, 3075.

No. 3075 possesses the glaberity and dwarf habit of var. *parviflorum* Ledeb. (var. *lalesarense* Bornm.), but the flowers are larger.

C. cerastoides (*L.*) *Britt.* var. **parviflorum** (*Ledeb.*) *Bornm.* in Beih. Bot. Centralbl. **28,** II, 150 (1911).

Arl Girt Pass (Kurdistan), 3000 m., white fl. with bright yellow stamens, very dwarf, in wet places, Aug. 31, *Ludlow Hewitt* 1504.

C. inflatum *Link.*

Rowanduz Gorge, 600 m., under rocks, etc., 18.4.32, 2095.

C. perfoliatum *L.*

Amadia, 1020 m., in damp places in the valley under shade of walls, etc., 26.3.31, 1235.

C. viscosum *L.*

Rowanduz Gorge, 26.3.30, 604 ; Mosul, in a garden, 8.4.32, *Yussef Lazar* 3388.

Dianthus cyri *F. et M.*

Baghdad (Karada), 10.5.20, *Paranjpye* 133.

D. aff. **hypochlorus** *Boiss. et Heldr.*

Beribedan, 2700 m., Aug. 31, *Ludlow-Hewitt* 1521.

This shows considerable resemblance to some specimens of *D. tabrisianus* Bien. (*Gilliat-Smith* no. 1842 from Persia), but our plant differs in the less deeply cut margins of the petals, and in the calyx scales being more abruptly mucronate as in *D. hypochlorus*. *D. hypochlorus* has somewhat narrower leaves, and occurs further to the west in Asia Minor. Our plant is represented by one specimen only.

D. libanotis *Labill.*

Chia-i-Mandali (nr. Walza), 1950 m., among rocks, fl. whitish flecked with purplish spots, 18.7.32, 2705.

D. orientalis *Sims* var. **brachyodontus** (*Boiss. et Huet*) *Boiss.* Fl. Or **1,** 495 (1867).

Chia-i-Mandali, 2400–2700 m., in large tufts or clumps on the rocky mountainside, 19.7.32, *Guest and Ludlow-Hewitt* 2795 ; Jabal, E.N.E. of Seri Hassan Beg, 2100 m., among rocks, 24.7.32, 2903.

D. orientalis Sims. var. **macropetalus** Boiss. in Fl. Or. Suppl. 7 (1888).

Chia-i-Mandali (nr. Walza), 1500–1800 m., on the stony mountainside, 18.7.32, 2663.

The plant is somewhat coarser growing than those cited by Boissier in Fl. Or. Suppl. 77.

Dianthus siphonocalyx *Blakelock* sp. nov. (§*Leiopetali* Boiss.) ; a *D. anatolico* Boiss. calyce sublongiore haud apice constricto, foliis longioribus angustioribusque ; a *D. pachypetalo* Stapf. squamis calycis obtusioribus haud membranaceo-marginatis differt. (Fig. IA, p.415).

Caules 20–50 cm. alti, graciles, ramosi vel simplices, basin versus pubescentes, ab basibus suffrutescentibus abbreviatis orientes. *Folia* linearia vel lineari-subulata, acuminata, 25–50 (raro 70) mm. longa, 0·5–1·5 mm. lata, margine scabrida, folia caulina trinervia, erecta, basi in vaginulam 1–3 mm. longam connata. *Squamae* calycinae 6–8, acutae vix mucronatae, haud membranaceo-marginatae, margine interdum parce ciliato, extimae 2·5 mm. longae 15 mm. latae, intimae 5 mm. longae, 2·5 mm. latae. *Calyx* cylindricus, apice haud constrictus, nervoso-striatus, viridis, vel rubro-suffusus, 12–19 mm. longus, 2–2·5 mm. latus, dentibus triangulari-lanceolatis, 2–2·5 mm. longis, ciliatulis, vix vel haud membranaceo-marginatis. *Petala* glabra ; lamina oblongo-cuneata, breviter dentata vel breviter bifida, 3–4 mm. longa, 1·5–2·5 mm. lata, luteo-virescens vel rosea (in sicco) ; unguis e calyce breviter exsertus c. 12 mm. longus. *Capsula* cylindrica c. 12 mm. long. *Semina* oblonga.

N. 'IRAQ : Jabal Rubal (or Robal), S. of Atrush, 750 m., rocky limestone slope (scrub oak forest), 14.7.33, *E. Guest* 3654 (type) ; Zawita, 780–1200 m., on rocky limestone slope, 26–29.7.33, *do.* 4471, 4526, 4580, 4650, 4683.

Another specimen in Herb. Kew, which is not in Mr. Guest's collection belongs to this species.

ASIA MINOR : Mardin (Kurdistania), in declivibus saxosis, 1.7.88, *P. Sintenis* 1156 (sub *D. anatolico*).

The laminae of the petals are more spreading than is shown in the figure.

D. strictus *Banks et Sol.* var. **gracilior** (*Boiss.*) *Eig* in Journ. Bot. **75,** 191 (1937). (*D. multipunctatus* Ser. var. *gracilior* Boiss. non *D. strictus* S. et S).

Mahad (nr. Shaikhan), used as a fodder plant, native name kia karaijak (K.), 23.6.32, *Salim Effendi* 2604 ; Arl Gird Dagh, 1800 m., on the mountainside, 21.7.32, 2821 ; Kirkuk Province, very useful grazing plant, native name gul khartalah, 14.5.33, *Ali Effendi Hadari* 3952 ; Atrush, 900 m., stony hillside, 13.7.33, 3647.

No. 3647 has rather smaller flowers than in the other numbers.

Distr. (of sp.) Crete, Asia Minor, Cyprus, Syria, Pal., 'Iraq, Pers.
(of var.) Asia Minor, Syria, 'Iraq.

D. strictus *Banks et Sol.* var. **gracilior** (*Boiss.*) *Eig* f. **nervosus** *Blakelock* forma nova ; nervi calycis ab apice ad basin decurrentes, raro nervi 2–4 sub dente breviter interrupti.

Rowanduz Gorge, 600 m., on the stony hillside, 25.7.32, *E. Guest* 2985 (type of *forma*) ; nr. Ain Sifni, 450 m., stony hillside pastures, 12.7.33, 4042.

This form does not show the large enervate areas on the calyx, which are characteristic of *D. strictus*.

Rowanduz Gorge, 750 m., 12.10.31, 1544.

No. 1544 is an autumn flowering shoot showing the same inflorescence characters as var. *axilliflorus* (Fenzl) Eig.

It may be mentioned here that " *Kotschy* 88 in monte Tauro, 1836 " in Herb. Kew includes a plant of *D. actinopetalus* Fenzl, as well as material which matches Boissier's description (in Fl. Or. **1,** 483) of var. *gracilior*. *D. actinopetalus* is distinguished from all the forms of *D. strictus* by possessing sterile leaf-rosettes, and by the calyx not being verruculoso-punctate.

D. strictus *Banks et Sol.* var. **micranthus** (*Boiss.*) *Eig* in Journ. Bot. **75,** 191 (1937).

Seri Hassan Beg, 1800 m., on the stony hillside, 24.7.32, 3036.

Distr. (of var.) Syria.

Our plant agrees with Boissier's description of var. *micranthus* (in Diagn. **1**, 8, p. 65 (1849)) except that the calyces are 12 mm. long, not " 5 lin. tantum longus".

Bornmüller in Verh. Zool. bot. Ges. Wien **48,** 562 (1898) determines as var. *micranthus* f. *glabra* Bornm. a specimen with calyces 14–15 mm. long (Libani : Sanin, 21.7. 1897 *Bornm.* 161), which is intermediate between the typical form of *D. strictus* and var. *micranthus* as originally described.

Gypsophila elegans *M.B.*

In gardens at Rustam, Baghdad, 13.5.33, *Yussef Lazar* 3924.

G. nabelekii Schischk. var. ? (*G. lignosa* Nábělek).

Arl Gird Dagh, 3300 m., among rocks, 22.7.32, *Guest and Ludlow-Hewitt* 2873.

There is no material of *G. nabelekii* Schisck. in the Kew Herbarium, but this plant agrees well with Nábělek's description and figures (in Publ. Fasc. Sc. Univ. Masaryk, Brno, No. 35, 42 (1923)) except for the

following characters—stems 2–9 flowered glandulose-scabrid towards the base, leaves glandulose-scabrid. It is, moreover, distinguished from the closely allied *G. briquetiana* Schisck. (in Candollea **3,** 474 (1928)) by the retuse petals and leaves glandulose-scabrid all over.

G. briquetiana (e descr) possesses entire petals and leaves scabrid on the margins and midrib. Our plant appears to be intermediate between the two species, but its accurate determination may be postponed until they are better known.

G. rokejeka *Del.*

Ghurfa plain, nr. Injana, Jabal Hamrin, sandy soil, perennial, 7.7.33, 4003 ; Baba Gurgur, nr. Kirkuk, 300 m., alluvial knoll on sandstone bluff, 8.7.33, 4013.

G. ruscifolia *Boiss.*

Jabal Rubal, 750 m., S. of Atrush, in oak forest on rocky limestone slope, fls. white, 14.7.33, 3656 ; Badi, nr. Dohuk, 825 m., on open hillside, 25.7.33, 4422.

Gypsophila sp.

Balad Sinjar, 439 m., on roadside grazing strip, 28.4.33, 4110 ; Kani Dolman Hills, Kirkuk, 390 m., on dry stony hill top, 30.4.33, 4300, 4372.

Material without flowers or fruit.

Holosteum glutinosum *F. et M.*

Amadia, 1050 m., on mountain slopes, 28.3.31, 1269 ; Zakho Valley, 600 m., 25.4.32, 2275.

H. umbellatum *L.*

Shargat (on ancient mounds at Ashur), Mar. 30, 400 ; Amadia, 1020 m., cultivated fields in valley, 30.3.31, 1389.

Lepyrodiclis paniculata *Stapf.*

Chia-i-Mandali, 2700 m., on a rocky cliff, 19.7.32, *Guest and Ludlow-Hewitt* 2696 ; Arl Gird Dagh, 2550 m., on rocks, 24.7.38, 2934.

Loeflingia hispanica *L.*

Southern Desert. W. of Zubair, on compact sandy soil covered by small stones and grit, 8.4.33, *Guest, Eig and Zohary* 5027.

Melandrium eriocalycinum *Boiss.*

Chia-i-Mandali, 1950 m., in a ditch by a cornfield, 20.7.32, *Guest and Ludlow-Hewitt* 2769 ; Arl Gird Dagh, 2150 m., by a stream, fls. white, 24.7.32, do., 2932 ; do. 2550 m., by a stream, 24.7.32, 2940.

Minuartia lineata (*C. A. M.*) *Bornm.*

Chia-i-Mandali, 2700 m., on rocks, 19.7.32, 3060 ; Arl Gird Dagh, 3300 m., in rocky places, 22.7.32, 3073.

No. 3060 shows some plants with a piloso-glandular tomentum while others are glabrous. Boissier (Fl. Or. **I,** 677) describes *lineata* as " glabra vel puberula " although Fenzl (in Ledeb., Fl. Ross **1,** 351) describes it as " herba glaberrima". As the other characters of the two forms agree both are here placed under *lineata.*

M. picta (*S. et S.*) *Bornm.*

Arbil, 27.3.30, 626 ; Dohuk, c. 450 m., in cultivated fields on dry gravel soil, 1.4.31, 1319 ; Ain Ghazal (Mosul Province), 360 m., in a field, 28.4.33, 4075 ; Balad Sinjar–Tal Afar, 330 m., on roadside strip of waste land and on semi-natural steppe, 28.4.33, 4147, 4159; Ain-al-Husan (nr. Sinjar), 315 m., on open *Poa* steppe, 28.4.33, 4219.

M. recurva (*All.*) *Schinz-Thellung.*

Siah Koh (Kurdistan), 3150 m., 5 white petals with long sepals, stamens red, style green, Aug. 31, *Ludlow-Hewitt* 1532 ; Arl Gird Dagh, 3000 m., on the mountain side, 22.7.32, 2840.

This plant differs from *M. hirsuta* (MB) Hd.-Mzzt. only in the glabrous or glabrescent sepals and pedicels. *M. recurva* is only recorded by Mattfeld (Fedde, Repert. Sp. Nov. **15,** 122 (1922)) from Asia Minor in the Orient (under the subsp. *juressi* (Willd.) Mattf.), but I doubt if the two species are really distinct.

M. tenuifolia (*L.*) *Hiern* subsp. **hybrida** (*Vill.*) *Mattf.* in Engl. Bot. Jahrb. **57,** Beibl. 126, 29 (1921).

Rowanduz Gorge, 450 m., in rock pockets, 20.4.32, 2136 ; Kani Dolman hills, Kirkuk, 390 m., on dry stony rounded hilltop, 36.4.33, 4315.

Saponaria vaccaria *L.*

Dolosur (Sulaimaniya), on daim land throughout the province, spring plant eaten by all animals, native name zizan, 18.4.32, *Gowan* 2426 ; Baghdad, in fields at Rustam, native name tojaij, 27.4.33, *Yussef Lazar* 3901 ; Ain Ghazal (Mosul Province), 360 m., in a field, 28.4.33, 4077.

No. 2426 is to young and No. 3901 is in fruit, so that they cannot be given a varietal name.

S. vaccaria *L.* var. **grandiflora** *Fisch.* in DC. Prodr. **1,** 365 (1824).

Tuz, 210 m., in cultivated fields, 6.4.31, 1393 ; nr. Mosul, 270 m., common in cornfields, Apr. 31, *Ludlow-Hewitt* 1557 ; seeds originally brought from wild pls. growing in the fields at Mahmudiya and now cultivated in several gardens in Baghdad, 12.4.32, 1949 ; Qara Tepe, in a cornfield, 15.4.32, 1958 ; Dohuk, 450 m., in a cornfield, 25.4.32, 2292 ; Bada, N. of Baghdad, on sandy loam in a vegetable garden, native name kharaz bint-al-fallah (="beads of the peasants' daughter"), 26.5.32, 2505 ; Tal Kaif, c. 300 m., useful for grazing sheep, native name paraibrah, Apr.–May 32, *Mudir of Tal Kaif* 3178 ; Mosul, in a wheat field, native name shabuwa-al-barri, 15.4.32, *Yussef Lazar* 3359.

Silene ampullata *Boiss.*

Penjwin, in the mountains, 26.6.32, *Khalil Feddo* 3447.

S. apetala *Willd.*

Khanaqin, 210 m., under shady overhanging ledges of rock in a gully, on dry stony soil, 29.3.32, 1868.

S. atocoides *Boiss.*

Rowanduz Gorge, 23.3.30, 594 ; Jindian, nr. Rowanduz, 25.3.30, 734 ; Amadia, c. 1050 m., on mountain side in damp shady places among rocks, 28.3.31, 1272 ; Rowanduz Gorge, 750 m., 18.4.32, 2107 ; Zakho

Pass, 750 m., on the mountain side on loose soil banks, 25.4.32, 2251 ; Suwara Tukka, 1050 m., on the mountain side amid scrub oak woods, 23.4.32, 2639.

S. chaetodonta *Boiss.*

Rowanduz Gorge, 540 m., by a waterfall on rocky ground, 17.7.32, 3015.

S. coniflora *Otth.*

Jazira Desert, 20.4.33, *Edmonds* 3820.

S. conoidea *L.*

Baghdad (Karada, cultivated fields), 12.3.20, *Paranjpye* 134 ; Kirkuk, 210 m., in cultivated fields, 4.4.31, 1379 ; Arbil, 390 m., in fields, 2.4.31, 1451 ; Mosul, 270 m. in cultivated fields, ditches, etc., 2.4.31, 1492 ; nr. Mosul, 270 m., common in corn fields, Apr. 31, *Ludlow-Hewitt* 1552 ; Dohuk, 450 m., in a cornfield on stony land, 21.4.32, 2157 ; Kirkuk in cornfield, 16.4.32, 2636 ; Ain Ghazal (Mosul Province), 360 m., in a field, 28.4.33, 4078.

S. eremophila *Bien.* (*S. setacea* Viv. var. *viscida* Boiss.).

Zubair, on somewhat compact sandy soil near cultivated area of " sulbiyah " (i.e. *Tamarix* groves in the desert interplanted with other crops when young and irrigated by wells), 8.4.33, *Guest, Eig and Zohary* 5016 ; Suliman Beg (nr. Tuz), 12.4.33, *Guest, Eig and Zohary* 5088.

S. longiflora *Ehrh.*

Chia-i-Mandali (nr. Walza), 1950 m., stony ground in a cornfield, 20.7.32, 2741.

This plant is smaller than most of the material of *S. longiflora* in Herb. Kew, but it is regarded as a depauperate from rather than as a distinct variety.

S. longipetala *Vent.*

Ser Amadia, 1800 m., native name lush (K.), 1932, *Majid Mustafa* 3604 ; Ain Ghazal (Mosul Province), 360 m., in a field, 28.4.33, 4067 ; Mosul–Tal Afar, 405 m., in fallow field, 26.4.33, *Guest, Eig and Zohary* 5113.

S. monantha *Boiss. et Haussk.*

Dohuk Gorge, Kurdistan, 450 m., on a limestone cliff, 25.7.33, 3710.

This specimen differs from the type (Herb. Boiss.) only in possessing slightly wider leaves. The type was kindly sent on loan by the Director of the Institut de Botanique et Herbier Boissier, Geneva.

S. odontopetala *Fenzl.* var. **glabrifolia** *Blakelock* in Kew Bull. 188 (1939).

Chia-i-Mandali, 2400 m., on a cliff, 19.7.32, 2803 ; Arl Gird Dagh, 3000 m., on the rocky mountain side, fls. white–yellow, 22.7.32, 2850 (type of var.) ; do., pinkish fls. 2860.

S. oliveriana *Otth.*

Qosh Tapa (nr. Arbil), 405 m., in cultivated fields, 2.4.31, 1474 ; Jabal Hamrin (nr. Table Mt.), 150 m., on sandy soil, 28.3.32, 1782 ; do., 30.3.32, 1906 ; Kani Dolman hills, Kirkuk, 390 m., on dry stony barren hilltop, 30.4.33, 4320.

S. rhynchocarpa *Boiss.*

Chia-i-Mandali, 2700 m., among rocks, 19.7.32, 2698 ; Arl Gird Dagh, 3000 m., on the mountainside, 22.7.32, 2841.

The flowering calyces of this plant are 2·5–2·9 cm. long. Bossier (Fl. Or. **1,** 618) gives the calyx of *S. rhynchocarpa* as " 10 lineas longus", but his type specimen in Herb. Kew (*Auch-Eloy* 444) has calyces of 2·5 cm. in length. This species is very closely allied to *S. moorcroftiana* Wall. of Afghanistan and the Himalayas.

S. rubella *L.*

Rustam, Baghdad, Mar. 30, 360 ; Rustam, in barley fields, 19.3.31, *Yussef Lazar* 1136 ; Baghdad in orchard at Karada, native name aiyun-ul-ha'ishah (="cow's eyes"), 13.4.32, 1996 ; Baghdad, in fields at Rustam, 25.3.33, *Yussef Lazar* 3920.

S. spergulifolia (*Desf.*) *M. B.*

Zawita, 1125 m., in oak forest on steep rocky slope, 28.7.33, 4549 ; Zawita, 900–1200 m., 27.7.33, 4667.

S. stenobotrys *Boiss. et Hausskn.*

Zawita, 825 m., on rocky slope, 30.7.33, 4814.

S. subulata *Boiss.*

Chia-i-Mandali, 2400-2700 m., on rocky mountain side, 26.7.32, 2792.

S. swertiaefolia *Boiss.*

Zakho Pass, 750 m., 25.4.32, 2283 ; Zawita Gorge, 900 m., on rocks, 26.7.33, 3713 ; Zawita, 1110 m., in oak forest on steep rocky slope, 28.7.33, 4615.

S. trinervis *Banks. et Sol.* (*S. racemosa* Otth.) var. **sibthorpiana** (*Rchb.*) *Eig* in Journ. Bot. **57,** 191 (1937).

Qosh Tapa (nr. Arbil), 405 m., native name shuwarah dhurah?, 2.4.31, 1480 ; Arbil, 375 m., in a cornfield on stony red loam, 20.4.32, 2135.

Spergularia diandra (*Guss.*) *Heldr. et Sart.*

Shargat, on well drained excavation heaps, Mar. 19, *Calder* 63 ; Baghdad, well drained situations, Apr. 20, *Paranjpye* 64 ; Rustam, 18.3.31, *Yussef Lazar* 1180 ; Salmon Pak (nr. Ctesiphon), on unirrigated pasture land, grazed by sheep and other animals, native name akrainah, 4.3.32, *Suiud al Dhahir* (a shepherd) 1948 ; Rustam, on a lawn (on salty ground by a channel), 11.4.32, 1999 ; Diwaniya (Hor-ad-dukhn), on irrigated land, fodder plant eaten by all animals native name rakaikah, *Sirkal Mohamed Ali* 2369 ; Nasiriya, in irrigated fields and gardens, eaten by all stock, native name arkikah, 18.4.32, *'Abdar-Razaq Barbuti* 2635 ; Suq-as-Shiyukh, on cultivated land, native name rakaijah, 10.4.32, *Qaimaqam of Suz-as-Shiyukh.*

S. marginata (*DC.*) *Kitt.*
Tuz, March 30, 668.

Stellaria media (*L.*) *Vill.*
Baghdad, in damp shady situations under palm trees at Karada date gardens, 13.3.31, 1111 ; Amadia, 1020 m., in valley in damp shady places under trees, walls, etc., 26.3.31, 1230 ; Makhlat, 165 m., among rocks under a small cliff, 29.4.33, 4276.

PORTULACACEAE

Portulaca oleracea *L.*
Seri Hassan Beg (nr. Rowanduz), 1500 m., on the hillside by a stream, 24.7.32, 3041.

TAMARICACEAE

Tamarix florida *Bge.*
Baquba, on the banks of the Diyala River, 30.4.32, 1894A, B, C, D.

T. macrocarpa (*Ehrenb.*) *Bge.*
Aziziya, Sept. 29, 212 ; Karbala, on the edge of a salt marsh, shrub 6 ft. high, native name tarfa, 28.11.31, 480 ; Basra (Kut-us-sayyid), a shrub, 15.12.31, 1638.

T. meyeri *Boiss.*
Rustam, on the banks of the Diyala, 21.3.32, *Yussef Lazar* 1873.

T. pentandra *Pall.* (*T. pallasii* Desv) var. **tigrensis** (*Bge.*) *Hand-Mazz.* in Ann. K. K. Nat. Hofm. **27,** 57 (1913).

Hilla, 6.6.20, *Paranjpye* 46 ; Basra, Oct. 29, 301 ; Sulaimaniya, May 30, 823 ; nr. Mandali, Ab-i-Naqt River, 9.5.30, 904 ; nr. Basra (Kut-us-Sayyid), native name athil, Apr. 31, *Dowson* 1637 ; Jadida, N. of Baghdad, forming a thicket along the banks of the R. Tigris, native name tarfa, 26.5.32, 2511A, B, C.

Tamarix spp.
Rowanduz Gorge, 600 m., 12.10.31, 458 ; in the Jazira, on sandy dunes by the Wadi Tharthar, native name tarfa, 16.10.32, 3552.

Material insufficient for accurate determination.

HYPERICACEAE

Hypericum assyriacum *Boiss.*
Badi, nr. Dohuk, 825 m., hillside, 25.7.32, 3685 ; Zawita Valley, 828 m., on red marl banks, 25.7.33, 4438 ; Zawita, 870 m., on red marl banks, 1.8.33, 4872 ; do., 982 m., on rocky slope in oak forest, 1.8.33, 4902.

H. haussknechtii *Bornm.*
Kirkuk Province, used as a medicine for putting on the wounds of animals, native name darmanahsurah, 14.5.33, *Ali Effendi Hadari* 3946.

H. hyssopifolium *Vill.* var. **lydium** *Boiss.* Fl. Or. **1,** 799 (1867).
Zawita Gorge, 840 m., rocky slopes, 26.7.33, 3724 ; Zawita, 930 m., on steep limestone crags, 27.7.33, 4523 ; Zawita, 900–1200 m., 28.7.33, 4665 ; do., 894 m., in oak forest on stony slope, 30.7.33, 4798 ; do., 1050 m., in oak forest, 1.8.33, 4943.

H. laeve *Boiss. et Hausskn.*

Sinjar, c. 300 m., from unirrigated land in the plain, native name aran or rashk (K.), sent as a fodder plant (?), but it should be noted that a pl. under these names has been reported as highly poisonous to stock from elsewhere, Apr., May 1932, *Mudir of Sinjar* 3113 ; Tal Afar, c. 300–450 m., a very poisonous pl. which causes the well-known local disease of " rojah " in sheep, native name rojah, 1.4.32, *Qaimaqam of Tal Afar* 3139 ; Humaidat Nahiya (Mosul), poisonous plant causing sickness and death among sheep, native name rojah, May 32, *Qaimaqam of Mosul* 3153.

H. laeve *Boiss. et Haussk.* ?

Baitnar, nr. Ain Sifni (Mosul), on hilly ground, very dangerous to stock, even a small quantity will kill sheep in the spring, native name rojah, 10.6.32, *Salim Effendi* 2574.

This specimen is too poor for accurate determination.

H. perforatum *L.*

Chia-i-Mandali, 1350 m., in a hedge, 20.7.32, 2756 ; Arl Gird Dagh (nr. Nawanda), 1846 m., by a stream, 21.7.32, 2807.

H. scabrum *L.*

Chia-i-Mandali (nr. Walza), 2100 m., among rocks, 18.7.32, 2677 ; nr. Amadia, native name tarbatmak (Assyrian) 1932, *Majid Mustafa* 3600 ; Zawita, 825 m., on stony slope, 27.7.33, 4530 ; do., 1170 m., in oak forest on steep rocky slope, 28.7.33, 4601 ; do., 1140 m., in pine wood, 29.7.33, 4714.

H. triquetrifolium *Turra* (*crispum* L.).

Kirkuk, Arbil, Shaqlawa, 300–900 m., in cultivated fields etc., poisonous to sheep although camels eat it, native name arran or zurnatic (K.), 17.7.32, 2995 ; Khanzad Pass, 690 m., on stony hilltop, 17.7.32, 3004 ; Tal Afar, 300–450 m.?, in the hills and on the steppe, poisonous to stock causing loss of hair and eventually a kind of apoplexy, native name aran, 1.4.32, *Qaimaqam of Tal Afar* 3138 ; Humaidat Nahiya (Mosul), poisonous to sheep and goats, native name aran, May 32, *Qaimaqam of Mosul* 3152 ; Tal Kaif, c. 300–600 m., harmful to sheep and causes a skin disease, which does not, however, lead to death, Apr.–May, 32, *Mudir of Tal Kaif* 3204 ; Zawita, 900 m., waste land in gardens, native name rashk (K.), 27.7.33, 3754 ; Kirkuk Prov., poisonous to animals, native name zurnatiq, 14.5.33, *Ali Effendi Hadari* 3943 ; nr. Altun Kopri on Zab River, c. 300m., on hills of Bakhtiari conglomerate, 8.7.33, 4018 ; nr. Ain sifni (N. of Mosul), 450 m., stony hillside pasture, poisonous to stock, 12.7.33, 4048 ; Ain Ghazal (Mosul Prov.), 360 m., in a field, 28.4.33, 4086A ; Balad Sinjar–Tal Afar, 330 m., on semi-natural steppe, 28.4.33, 4177 ; Badi, nr. Dohuk, 825 m., on open hillside, 25.7.33, 4423 ; Zawita, 900 m., on old abandoned vineyard, 1.8.33, 4892.

Malvaceae

Alcea aff. **ficifolia** L.

Arl Gird Dagh, 1800 m., on the hillside, white, 20.7.32, *Guest and Ludlow-Hewitt* 2782 ; Shaikh Adi (N. of Mosul), 900 m., on the hillside, pale cream fls., 14.7.33, 3672 ; nr. Ain Sifni (N. of Mosul), 450 m., stony hillside pasture, pale cream yellow, native name gul hailu (K.), 12.7.33, 4049.

These gatherings differ from the majority of the material of *A. ficifolia* L. in flower colour, longer peduncles and less leafy inflorescence, and from *A. tholozani* Stapf in the hairy seeds. I am reluctant to describe these as a new species, as the limits of the species of *Alcea* in the Orient are far from clear, and a revison of the group is required.

A. ficifolia *L.* var. **violacea** *Boiss.* Fl. Or. **1,** 833 (1867).

Rustam, probably an escape from gardens, but not uncommon round Baghdad, native name ward al khatmah, 2.5.31, *Yusṣef Lazar* 1165 ; Qara Tepe–Kifri, 150 m., common in cultivated fields, white, pink, and red, 15.4.32, 1959.

All material under the above numbers shows reddish or violet flowers in the dried condition.

A. hohenackeri (*Boiss. et Huet*) Boiss. ?

Rowanduz Gorge, 600 m., on the stony mountainside, a beautiful white hollyhock, 25.7.32, 2984.

In the absence of ripe fruit, this plant can only be doubtfully determined.

A. kurdica (*Schlecht.*) *Alef.*

Atrush, 900 m., stony hillside, 13.7.33, 3648 ; Zawita, E. of Dohuk, Kurdistan, 900 m., pale mauve or white fls., on waste land in gardens, native name gul hailu (K.), 27.7.33, 3756, 3757.

Alcea sp.

Nr. Altun Kopri, Zab River, Bakhtiari conglomerate hills, pale yellow almost white flowers, 8.7.33, 4019 ; Baba Gurgur, 360 m., 1.5.33, 4387.

No. 4387 has neither flowers nor fruit, but seems to agree with No. 4019 in tomentum and leaf shape. The fruit of no. 4019 agrees with those of *A. kurdica* (Schlecht) Alef., but our plant has a very dense tomentum and pale yellow flowers. Ulbrich's descriptions (in Fedde, Repert. Sp. Nov. **13,** 518–521 (1916)) of *A. oppenheimii* and *A. wolfii* do not appear to fit our plant, nor do Boissier and Haussknecht's descriptions of *A. arbelensis* and *A. peduncularis*. Authenticated material of these four species is not, however, available for comparison.

Alcea spp.

Makhlat, 180 m., open *Stipa* steppe, native name khutmah, 29.4.33, 4244 ; Kani Dolman hills, Kirkuk, 390 m., dry rounded hill top, 30.4.33, 4366 ; Kani Dolman hills, 390 m., 30.4.33, 4298 ; Zawita, 1170 m., in oak forest on a steep rocky slope, 4599.

Material insufficient for accurate determination.

Althaea cannabina *L.*

Zawita, Kurdistan, 900 m., ditches and damp places in gardens, leaves used as a substitute for tea, pink fls., native name chai (K.), 27.7.33, 3744.

A. hirsuta *L.*

Baqasra (nr. Ain Sifni), 375 m., fodder plant, native name khirkhiruk (K.), 10.6.32, *Salim Effendi* 2577.

A. ludwigii *L.*

Baghdad, in a field at Rustam, native name sataih, 25.4.33, *Yussef Lazar* 3910.

Gossypium herbaceum *L.*

Ain Sifni, 450 m., local cotton, cultivated by irrigation (used for stuffing, etc.), 10.10.31, 1654.

Hibiscus mutabilis *L.*

Baghdad, in a garden grown from Indian seed, 23.12.31, 1611.

H. trionum *L.*

Ain Sifni (N. of Mosul), 450 m., in a cotton field, 10.10.31, 1649 ; Rustam, on a channel, native name jiljil, June 32, 3421 ; Husainiya (Kut), in fields of summer crops, native name jiljil, 16.9.32, 3494.

Malva aegyptia *L.*

Tuz, 210 m., in cultivated fields, 6.4.31, 1398 ; Tursak, nr. Mandali, pink, native name bakhatri (?), 26.3.32, 1733.

M. nicaeensis *All.*

Arbil, 27.3.30, 627 ; Baghdad in a date garden at Karada, native name khubbaz, 20.2.31, 1084 ; Tuz, 210 m., in cultivated fields, 6.4.31, 1390 ; Arbil, 375 m., in cultivated fields, 2.4.31, 1465 ; Baghdad, in fields at Rustam, native name khubbaz, 22.3.33, *Yussef Lazar* 3922.

M. montana Forsk. is given by Hayek in Prod. Fl. Penins. Balcan. **1,** 547 (1924) as the earliest name of this species. This is incorrect. Forskaal's type specimen of *M. montana* on loan from the Herbarium Forskalii has been examined and is *M. verticillata* L.

M. parviflora *L.* var. **microcarpa** (*Desv.*) *Fiori et Paol.* Fl. Anal. d'Ital **2,** 268 (1900–2).

Balad Sinjar, 429 m., on roadside strip of grazing, 28.4.33, 4109A.
Distr. Mediterranean Region and widespread as an alien weed.

Sida sherardiana (*L.*) *Bth.*

Dohuk, 462 m., in a cornfield on stony land, 21.4.32, 2164.

TILIACEAE

Corchorus olitorius *L.*

Rustam, cultivated from seed imported from Egypt, the leaves are used for soup and as a salad, native name malukiyah, 19.10.31, 479.

C. trilocularis *L.*

Baghdad, July 20, *Paranjpye* 100.

Grewia subinaequalis *DC.*

Rustam Garden, Oct. 29, 317.

This matches Indian specimens in Herb. Kew, so named by J. R. Drummond.

STERCULIACEAE

Glossostemon bruguieri *Desf.*

Quratu (nr. Khanaqin), c. 300 m., in a wheat field, said to be used as an aphrodisiac (?), the roots of this plant are said to have been exported to Egypt in fairly large quantities before the war, in Egypt the product is known as mughat, native name arab qozi, 15.6.32, *Amin Effendi* 2620.

LINACEAE

Linum angustifolium *L.*

Daltawa, on marshy ground, wild linseed, fl. blue, native name rumaiminah (?), eaten by all animals, 26.5.32, 2629.

L. grandiflorum *Desf.*

Rustam garden, Apr. 30, 251.

L. mucronatum *Bert.* (*L. orientale* Boiss.).

Altun Kopri–Kirkuk road, 27.3.30, 631 ; nr. Kirkuk, on the road to Baba Gurgur oil wells, 300 m., in loose sandy soil, 4.4.31, 1349 ; Jabal Darawishka (nr. Khanaqin), 240 m., on stony hillside, pale yellow, almost white, 28.3.33, 1757 ; Naft Khana, 150 m., on stony hillside, forms a flat rosette on the ground with pale yellowish-white fls., 29.3.32, 1857 ; Ain Sifni (Mosul Liwa), 600 m., hilly ground, useful fodder plant, native name kulilkah aspi (K.), 10.6.32, *Salim Effendi* 2564 ; Dohuk, yellow fls., native name gia nuk (K.), 2.6.32, *Makki Beg* 3255 ; Dohuk, on the hill, 26.4.32, *Yussef Lazar* 3348 ; Kani Dolman hills, Kirkuk, 390 m., on dry rounded stony hilltop, 30.4.33, 4341.

L. pubescens *Banks et Sol.*

Zakho Valley, 617 m., in grassy patches among scrub oak, colour of fl. pink, 25.4.32, 2271.

L. rigidissimum *Post* ?

Nr. Zawita, 750 m., on red loam banks, beautiful orange fls., 23.4.32, 2175 ; do. 1200 m., on rocky plateau, 28.7.33, 4578.

This plant is closely allied to *L. syriacum* Boiss. et Gaill and *L. sulphureum* Boiss. et Haussk. It is distinguished from them by the scabrid-puberulent leaves of the sterile rosettes, which are formed after flowering. These leaves persist at the base of the erect flowering stems during the flowering period. *L. rigidissimum* Post was described from imperfect material in Journ. Linn. Soc. Bot. **24,** 424 (1888) and there is no material of this species available ; the determination is only provisional.

L. strictum *L.*

Makhlat, 185 m., on open *Stipa* steppe, 29.4.33, 4243.

ZYGOPHYLLACEAE

Fagonia bruguieri *DC.*

Southern Desert, W. of Zubair, 8.4.33, *Guest, Eig and Zohary* 5044.

Tribulus alatus *Del.*

By the Habbaniya Lake, on the shore, native name qutainah, 14.10.32, *Yussef Lazar* 3539 ; Mahmudiya, on the Latitiya Estate, 2.11.31, *Garbutt* 3592.

T. terrestris *L.*

Kut, Sept. 29, 206 ; Rustam, native name qutub, 2.6.31, *Yussef Lazar* 273 ; do., in a vegetable garden, 31.10.32, *Yussef Lazar* 273A ; Qutriya (Kut Liwa), native name qutub, 8.10.30, 1041 ; Bada (N. of Baghdad), 26.5.32, 2496 ; Seri Hassan Beg, 1500 m., spreading over barren ground near a stream, 24.7.32, 3040 ; Baghdad (Harathiya Estate), creeping over barren soil by a seepage pool, 14.7.32, 3227 ; Haditha, in a field of millet, native name qutub, 15.10.32, 3524.

Nitraria retusa (*Forsk.*) *Asch.*

Nr. Mandali in a wadi, thorny scrub, native name ausaj sarim, 26.3.32, 1731.

Zygophyllum fabago *L.*

Rustam, on waste land by the river bank, native name khunaiq-ad-dijaj, 1.8.32, 3410.

GERIANACEAE

Biebersteinia multifida *DC.*

Sulaimaniya, 900 m., 30.3.32, *Ludlow-Hewitt* 1937 ; Marmarut Mt. (Rowanduz area), 1231 m., on the stony mountainside, 19.4.32, 2086.

Erodium bryoniaefolium *Boiss.*

Jabal Hamrin (nr. Table Mt.), 150 m., on dry sandy soil, 28.3.32, 1822.

E. ciconium (*L*) *L'Her.*

Shargat (on the Zigurat mound at Ashur), Mar. 30, 404 ; nr. Kirkuk, 300 m., at edge of a cultivated field on the road to Baba Gurgur oil wells, brilliant blue fls., 24.3.31, 1201.

E. cicutarium (*L*) *L'Her.*

Sumaicha (nr. Samarra), Feb. 30, 389 ; Shargat (on ancient mounds at Ashur), Mar. 30, 395 ; Mandali, 10.5.30, 897 ; nr. Felluja, on " khor", " haswah " and cultivated land, native name bakhatri, 6.3.30, 953, 960, 975 ; Baghdad, in shady places in date gardens at Karada, Feb.–Mar. 31, 1085 ; Rustam, in cultivated fields, 12.3.32, *Yussef Lazar* 1138 ; Amadia (Kurdistan), 1050 m., in fields in the valley, 28.3.31, 1275 ; Dohuk, 450 m., in cultivated fields, 1.4.31, 1302 ; Amadia, 1050 m., in valley, 28.3.31, 1444 ; Arbil, 360 m., on a grassy bank, 2.4.31, 1454 ; Tauq Chai, in a dry stony torrent bed, 16.4.32, 1976 ; Dohuk, 450 m., in a cornfield, 23.4.32, 2320 ; nr. Mahmudiya (Latifiya Estate), 16.5.32, 2386 ; Jazira Desert, Mar.–Apr. 33, *Edmonds* 3801 ; Kirkuk Province, excellent grazing plant, native name bakhatri, 12.5.33, *Ali Effendi Hadari* 3927 ; Balad Sinjar–Tal Afar, 330 m., on semi-natural steppe, 28.4.33, 4158 ; Ain-al-Husan (nr. Sinjar), 315 m., on open *Poa* steppe, 28.4.33, 4231 ; Makhlat, 165 m., among rocks under a cliff, 29.4.33, 4274 ; Kani Dolman Hills, Kirkuk, 390 m., on dry rounded stony hilltop, 30.4.33, 4337.

E. glaucophyllum (*L*) *L'Her.*

Jazira Desert, Mar.–Apr., 1933, *Edmonds* 3802.

E. gruinum (*L*) *L'Her.*

Kirkuk, 180 m., 28.3.32, *Ludlow-Hewitt* 1918 ; Dohuk, 25.5.32, *Makki Beg* 3245.

E. laciniatum (*Cav.*) *Willd.* var. **pulverulentum** (*Cav.*) *Boiss.* Fl. Or. **1,** 893 (1867).

Nr. Felluja, on " haswah" land, native name bakhtari, 6.3.30, 960A; Jabal Hamrin (nr. Table Mt.), 150 m., in sandy pockets on dry ledges of rock, 28.3.32, 1815 ; Jaliba (nr. Suq-as-Shiyukh), on sandy soil with small grit on the surface, 8.4.33, *Guest, Eig and Zohary* 5073.

E. malacoides (*L*) *Willd.*

Baghdad in shady places in date gardens at Karada, native name bakhtari, Feb.–Mar. 31, 1085A.

E. moschatum (*L*) *L'Her.*

Arbil, 360 m., in cultivated fields, 2.4.31, 1448.

Geranium dissectum *L.*

Baghdad, among grass near the irrigation canals in date gardens at Karada, Mar. 31, 1115 ; Kirkuk, 210 m., in a cornfield, damp situation near a marshy patch of land, 16.4.32, 1990 ; Hilla, on unirrigated land, eaten by horses, cattle, etc., native name bakhtari, 28.5.32, *Civ. Vet. Surgeon of Hilla* 2524.

G. kurdicum *Bornm.*

Arl Gird Dagh, 3000 m., among clumps of thistles on the hillside, 24.7.32, *Guest and Ludlow-Hewitt* 2805.

G. lucidum *L.*

Rowanduz Gorge, on rock near waterfall, 26.3.30, 589 ; do., 600–750 m., near a waterfall, under rocks, etc., fl. pink, 18.4.32, 2057, 2110.

G. molle *L.*

Rowanduz Gorge (Kurdistan), 450 m., on a grassy slope, under rocks, 17.4.32, 2027.

G. pusillum *L.*

Nr. Rowanduz, 750 m., on dry hillside, 18.4.32, 2048 ; Zummar (Tal Afar), c. 300–450 m.?, good fodder plant, fresh or dry, native name bakhatri, Apr.–May 32, *Mudir of Zummar* 3142.

G. rotundifolium *L.*

Baghdad (Karada), in sandy places near channels in date garden, Mar. 31, 1116 ; do., in scanty undergrowth of an apricot orchard at Karada, 20.3.32, 1672 ; nr. Rowanduz, 600 m., 18.4.32, 2546A.

G. tuberosum *L.*

Diana, nr. Rowanduz, 26.3.30, 705 ; Jindian, nr. Rowanduz, 25.3.30, 731 ; Dohuk, 450 m., in cultivated fields, 1.4.31, 1294 ; Rowanduz Gorge (Kurdistan), 600 m., very common on the mountainsides, purplish pink, 18.4.32, 2094 ; Zawita, 600–900 m., 23.4.32, 2217 ; Ain Ghazal (Mosul Province), 360 m., in a field, 28.4.33, 4083.

Geranium sp.

Amadia, 1020 m., in ditches and damp places, 26.3.31, 1244.

Either *G. molle* L or *G. rotundifolium* L, but this specimen has not been accurately determined in the absence of ripe fruits.

Oxalis corniculata *L.*

Baghdad, along irrigation channels in shady parts of a date garden at Karada, Mar. 31, 1114.

Rutaceae

Haplophyllum propinquum *Spach.*

Nr. Rustam, Arabic name jifjaf, Aug. 29, 159 ; nr. Mandali, on stony plain, 5.5.30, 856 ; Makatu, nr. Mandali, May 30, 874 ; Rustam,

native name zifrah, 2.5.31, *Yussef Lazar* 1163 ; Naft Khana, 150 m., on stony hillside, 29.3.32, 1854 ; Bada (N. of Baghdad), on sandy loam, 26.5.32, 2501 ; Kirkuk Province, May 33, *Ali Effendi* 3855 ; Ghurfa Desert, 7.7.33, 3998 ; Baba Gurgur, nr. Kirkuk, 300 m., alluvial knoll on sandstone bluff, 8.7.33, 4011 ; Kani Dolman hills, Kirkuk, 390 m., dry stony rounded hilltop, 30.4.33, 4299 ; Ain-al-Husan (nr. Sinjar), 315 m., on *Poa* steppe, 28.4.33, 4205.

No. 4205 is more glabrous than the other numbers and resembles *haussknechtii* Boiss. It is included here as I am uncertain if *H. haussknechtii* is a distinct species.

H. villosum (*M.B.*) *Juss.*
Arbil, in a cornfield on red loam, 20.4.32, 2130 ; Dohuk, 450 m., in a cornfield, 24.4.32, 2238 ; Baqasra (nr. Ain-Sifni), fodder plant, native name darmani zar dawwarah (K.), 15.5.32, *Salim Effendi* 2587 ; Arbil (?), 22.4.32, 3077 ; Tal Kaif, c. 600 m., in the hills, useful for sheep grazing, native name zafah, Apr.–May 32, *Mudir of Tal Kaif* 3214.

Peganum harmala *L.*
Mandali, 9.5.30, 764.

Rhamnaceae

Paliurus spina-Christi *Mill.*
Rowanduz, 26.3.30, 578A ; Dohuk-Amadia (Kurdistan), very common, 450–1200 m., 10.10.31, 1567; Chia-i-Mandali, up to 1350 m., on the hillside, thorny shrub up to 6–7 feet high, 20.7.32, *Guest and Ludlow-Hewitt* 2761 ; Atrush, Kurdistan, 900 m. on red marl banks in open pine forest, 13.7.33, 4396 ; Zawita, 1050 m., on rocky slope, 28.7.33, 4645.

Rhamnus kurdica *Boiss. et Hoh.*
Zawita Gorge, 780 m., on limestone rocks, 26.7.32, 3728.

R. pallasii *F. et M.* var. **intermedia** *Bornm.* in Beih. Bot. Centralbl. **57,** 250 (1937).

Zawita, 850 m., on rocky mountain slope, 26.7.33, 4493.

This plant matches Bornmüller's type (no. 1021) of var. *intermedia*. It appears intermediate between *R. pallasii* and *R. kurdica*.

Zizyphus nummularia (*Burm.*) *Wight et Walk-Arn.*
Nr. Fatta Gorge, on open stony desert, small shrubs 3–4 ft. high, native name sidr, 18.10.32, 3551 ; Southern Desert (between Zubair and Jaliba), in a depression, tree, 8.4.33, *Guest, Eig and Zohary* 5067.

The leaves of no. 5067 are not as densely tomentose as most of the material in the Kew Herbarium.

Z. spina-Christi *L.*
Basra, Oct. 29, 299.

var. **inermis** *Boiss.* Fl. Or. **2,** 13 (1872).
Almost certainly coll. near Mosul or Kirkuk, 154.

VITACEAE

Vitis vinifera *L.*

Arl Gird Dagh, 900–1500 m., growing wild over trees by streams in the valley, 20.7.32, 2776 ; Zawita, 1080 m., in pine forest on steep rocky slope, 28.7.33, 4630 ; do., 870 m., in oak forest on stony slope, 30.7.33, 4800.

ACERACEAE

Acer cinerascens *Boiss.* var. **bornmulleri** *Schwer.* in Mitt. Deutsch Dendr. Ges. 111 (1898) f. **medicum** *Schwer.* l.c.

Zawita, 1050 m., on N. slope in Pine forest, 27.7.33, 4509.

A. cinerascens *Boiss.* var. **bornmulleri** *Schwer.* f. **longipes** *Bornm.* in Verh. Zool.—Bot. Ges. Wien 571 (1898).

Rowanduz Gorge, 750 m., 12.10.31, 450 ; do., c. 600 m., on the mountainside among small oak trees, etc., small tree, 17.4.32, 2025.

A. cinerascens *Boiss.* var. **paxii** *Schwer.* l. c. f. **subglabrum** *Bornm.* l.c. Zawita, 990 m., in small rocky ravine, 30.7.33, 4783.

ANACARDIACEAE

Pistacia khinjuk *Stocks.*

Nr. Zawita, 900 m., small tree growing among rocks on the hillside above a gorge, 10.10.31, 1658 ; Zawita, 930 m., rocky limestone slope, 27.7.33, 3731 ; do., 840 m., small tree, rocky ravine, 27.7.33, 3738A ; do., on rocky plateau, 1231 m., 28.7.33, 4566 ; do., 1200 m., in oak forest on steep rocky slope, 28.7.33, 4589 ; do., native name buimk (K.), 29.7.33, 4734 ; do., 1230 m., in open oak forest, 30.7.33, 4866 ; do., 900 m., an old abandoned vineyard, 1.8.33, 4891 ; do., in pine forest, 1005 m., 1.8.33, 4955.

P. mutica *Fisch. et Mey.*

Acra (N. of Mosul), 750 m., fruit is eaten, Sept. 30., *Muhammad Salim ar Rhaddi* 1400 ; Rowanduz Gorge, 600 m., fruit is eaten, 12.10.31, 1595 ; Shaikh Adi (N. of Mosul), 825 m., the kernel of the stone is eaten, the flesh of the fruit is bitter and cannot be eaten, native name butum, habbat khadhra or (in Kurdish) gazwan, 10.10.31, 1643 ; Iskeftendiwan, nr. Shaikh Adi, 750 m., in a graveyard, fine spreading tree, 14.7.33, 3666 ; Zawita, c. 900 m., 25.7.33, 3699 ; Zawita (Gali Qashk), 840 m., small tree in rocky ravine, 27.7.33, 3738 ; Zawita (E. of Dohuk), 900–1050 m., locality of village, large spreading trees, used for making soap, etc. (seeds), 27.7.33, 3760, 3761 ; Zawita, 1005 m., in dense pine forest, 30.7.33, 4835 ; do., 1165 m., 30.7.33, 4843.

Rhus coriaria *L.*

Toweit Valley, May 30, *Paterson* 851 ; Shaikh Adi (N. of Mosul), 825 m., 10.10.31, 1648 ; Dohuk, 510 m., 10.10.31, 1662; Chia-i-Mandali, 1350 m., cultivated, in hedges near a village, 20.7.32, 2759 ; Zawita valley, 945 m., among limestone crags, 25.7.33, 4452 ; Zawita, 1050 m., in pine forest on N. slope, 27.7.33, 4511 : Zawita, 990 m., in a small rock ravine, 30.7.33, 4778.

LEGUMINOSAE

Acacia farnesiana *Willd.*
Rustam, Oct. 29, 315 ; Siba, nr. Abadan, a single thorny tree about 20 ft. high growing on the edge of the desert near a date garden, apparently therefore indigenous and self-sown, 8.12.31, 1614.

Albizzia julibrissin (*Willd.*) *Benth.*
Rustam, Oct. 29, 321.

Alhagi maurorum (*L*) *DC.*
Baghdad, Arabic agul, July 29, 180.

Alhagi sp.
Makhlat, 180 m., on open *Stipa* steppe, 29.4.33, 4242.

This specimen possesses neither flowers nor fruits.

Anagyris foetida *L.*
Between Dohuk and Suwara-Tukka, 600–900 m., common, fls. yellow, small shrub 3–6 ft. high, 30.3.31, 1328 ; Zakho Valley, 600 m., common on hillside, small shrub, 25.4.32, 2263 ; Dohuk, 450 m., common on the hills of the locality, shrub, native name kifr, 25.4.32, 2291 ; Kirkuk Province, deadly poison to man and beast, native name qarahtaj, May 33, 3956 ; Shaikh Adi Gorge, 750 m., on limetsone rocks, 14.7.33, 4411 ; Zawita, 825 m., on red marl banks, 25.7.33, 4440 ; do., 870 m., in oak forest on rocky slope, 30.7.33, 4799 ; do., 900 m., on old abandoned vineyard, 1.8.33, 4894.

Argyrolobium crotalarioides *Jaub. et Spach.*
Zawita, 780 m., on limestone rocks, low tufted shrubby herb, 26.7.33, 3726 ; do., 871 m., on rocky mountain slope, 26.7.33, 4480 ; do., 1050 m., on rocky limestone slope, 28.7.33, 4653, 4654 ; Zawita, 1020 m., in pine forest, 30.7.33, 4831.

Bauhinia variegata *L.*
Rustam Garden, Apr. 30, 250.

Caesalpinia bonducella *Flem.*
Garden in Basra, said to have come from Muscat, Arabia, Oct. 29, 298.

C. gilliesii *Wall.*
Garden at Hinaidi. Oct. 29, 327.

Cassia didymobotrya *Fres.*
Baghdad, in gardens, shrubs grown from seed imported from India, 23.12.31, 1615.

C. occidentalis *L.*
Rustam, Oct. 29, 271 ; Basra, in gardens, probably not indigenous, 15.12.31, 1640.

Cercis siliquastrum *L.*
Zawita (Gali Qashk), 840 m., in a rocky gorge, small tree, 27.7.33, 3737.

Chesneya rhytidosperma *Jaub. et Spach.*
Khanzad Pass (nr. Arbil), 480 m., on the stony hillside, 20.4.32, 2133.

Colutea sp.

Zawita, c. 900 m., rocky slope, native name fazqurq, 30.7.33, 4804.

Either *C. arborescens* L. or *C. cilicica* Boiss. et Bal., but this specimen has no flowers to show which of the two species it belongs.

Coronilla scorpioides (*L.*) *Koch.*

Qosh Tapa (nr. Arbil), 405 m., 2.4.31, 1468 ; Dohuk-Zakho, 450 m., 25.4.32, 2303 ; Arbil, 375 m., in a cornfield, 21.4.32, 2166 ; Hamam Ali (Mosul), in a wheat field, native name karainah, 15.4.32, *Yussef Lazar* 3405 ; Arbil Prov., grazed by animals, May 33, *Mhd. ad Radhi* 3864 ; Ain Ghazal (Mosul Province), 360 m., in a field, 20.4.33, 4070.

Coronilla varia *L.*

Arl Gird Dagh, 1800 m., by a stream, fls. delicate pink, 21.7.32, 2816 ; Penjwin, in the mountains, 26.6.32, *Khalil Feddo* 3450.

Cytisus albidus *DC.*

Unknown locality, Apr. ? 33, *Guest, Eig and Zohary* 5120.
Presumably cultivated.

Dalbergia sissoo *Roxb.*

Rustam, nr. Baghdad, Oct. 29, 277.
Presumably cultivated.

Ervum lens *L.*

Dohuk-Zakho, 450 m., cultivated crop of lentils (rain-grown), 24.4.32, 2245 ; Dolosur (Sulaimaniya), on mountainsides among oak trees, native name niska kewlah, 17.4.32, *Gowan* 2413 ; Baghdad, in fields at Rustam (probably an escape from cultivated crops), native name adas, 25.4.33, *Yussef Lazar* 3902.

No. 2413 approaches *E. orientale* Boiss. in corolla colour and length of peduncle.

E. orientale *Boiss.*

Kani Dolman hills, Kirkuk, 390 m., on dry stony hilltop, 4328.

Glycyrrhiza glabra *L.* var. **glandulifera** (*Reg. et Herd.*) *Boiss.* Fl. Or. **2,** 202 (1872).

Chia-i-Mandali (nr. Walash), 1050 m., at the edge of a field, 18.7.32, 2668 ; do. (nr. Walza), 1650 m., in a cultivated field, very strong smell like sweet-scented geranium, 18.7.32, 2669 ; Jabal, E.N.E. of Seri Hassan Beg, at the edge of a field, 24.7.32, 3000.

Hedysarum aff. **candidissimum** *Freyn.*

Jabal Rubal, S. of Atrush, 750 m., in scrub oak forest, 12.7.33, 3616.

This plant is " floribus exceptis undique adpressissime argenteum " as in Freyn's description of *H. candidissimum* from Turkish Armenia (Oest. Bot. Zeit. **42,** 80 (1892)), with which it otherwise agrees fairly well. As Freyn's species was described from flowering material, and our plant shows only the fruits (which resemble those of *H. kotschyi* Boiss.) the identification is doubtful.

H. varium *Willd.*

Atrush, 900 m., on red marl banks, in open pine forest, 13.7.33, 4391.

Hippocrepis bicontorta *Lois.*

Kowait, 20.3.32, *Mrs. Hubert Young* 1695 ; Southern desert, W. of Zubair, on compact sandy soil, covered by small stones and grit, 8.4.33, *Guest, Eig and Zohary* 5037.

Hippocrepis bisiliqua *Forsk.* (*H. biflora* Boiss.).

Jabal Hamrin (nr. Table Mt.), on dry sandy soil, 30.3.32, 1907 ; Kirkuk, 210 m., in cultivated fields, 4.4.31, 1380 ; Tuz, 215 m., in cultivated fields, 6.4.31, 1395 ; Khanaqin, on stony ground, 29.3.32, 1838 ; Acra, 450–900 m., native name gia raichtuk, mid-Apr. 32, *Qaimaqam of Acra* 3099 ; Mosul, in a wheat field, native name karainah, 9.4.32, *Yussef Lazar* 3402 ; Makhlat, 180 m., on open *Stipa* steppe, native name qarainah, 29.4.33, 4256.

Lotus corniculatus *L.*

Chia-i-Mandali (nr. Walza), 1800–2100 m., by a stream near a cornfield, 19.7.32, 2733 ; Arl Gird Dagh, 1800 m., by a stream, orange and yellow fls., 21.7.32, 2846.

L. gebelia *Vent.* var. **villosus** *Boiss.* Fl. Or. **2,** 168 (1872).

Jabal, E.N.E. of Seri Hassan Beg, 1950 m., on rocky mountain slope, fls. variegated pink and white, 24.7.32, *Guest and Ludlow-Hewitt* 2897 ; Arl Gird Dagh, 2100 m., in a cornfield, fls. white and pink, 24.7.32, *Guest and Ludlow-Hewitt* 2926.

L. pusillus *Medik.*

Zubair, on somewhat compact sandy soil near cultivated area of " sulbiyah " (i.e. Tamarix groves in the desert, interplanted with other crops and irrigated by wells when young), 8.4.33, *Guest, Eig and Zohary* 5015.

L. tenuifolius (*L.*) *Rchb.*

Nr. Mandali, 9.5.30, 769 ; Daltawa, on marshy ground, native name qurt (?), 26.5.32, 2630.

Hymenocarpus circinnatus (*L.*) *Savi.*

Jabal Hamrin (nr. Table Mt.), dry sandy soil, 30.3.32, 1903 ; Dohuk, a constituent of pastures on stony " daim " land (i.e. unirrigated), eaten by sheep but not greatly relished, native name taqalushk (K.), 5.5.32, *Makki Beg* 3239 ; Mosul (Mar Jirjis), in a wheatfield, native name karainah, 22.5.32, *Yussef Lazar* 3403.

Lathyrus aphaca *L.*

Rowanduz Gorge, 750 m., 18.4.32, 2120.

L. annuus *L.*

Baghdad, in scanty undergrowth of an apricot orchard at Karada, yellow, native name hub-ud-dharat or hurtuman, 13–20.3.32, 1673, 1997, 1997A.

L. chloranthus *Boiss.*

Seri Hassan Beg, 1500 m., in the hedge of an orchard, fls. greenish yellow, 24.7.32, 3038.

L. cicera *L.*

Rustam, commonly cultivated as a crop, native name hurtuman, Apr. 31, *Yussef Lazar* 227 ; Arbil, 375 m., in cultivated fields, salmon pink, 2.4.31, 1449 ; Baquba, in a cornfield, native name hurtuman haiyah, 25.3.32, 1711 ; Rowanduz Gorge, 750 m., in the spray of a waterfall,

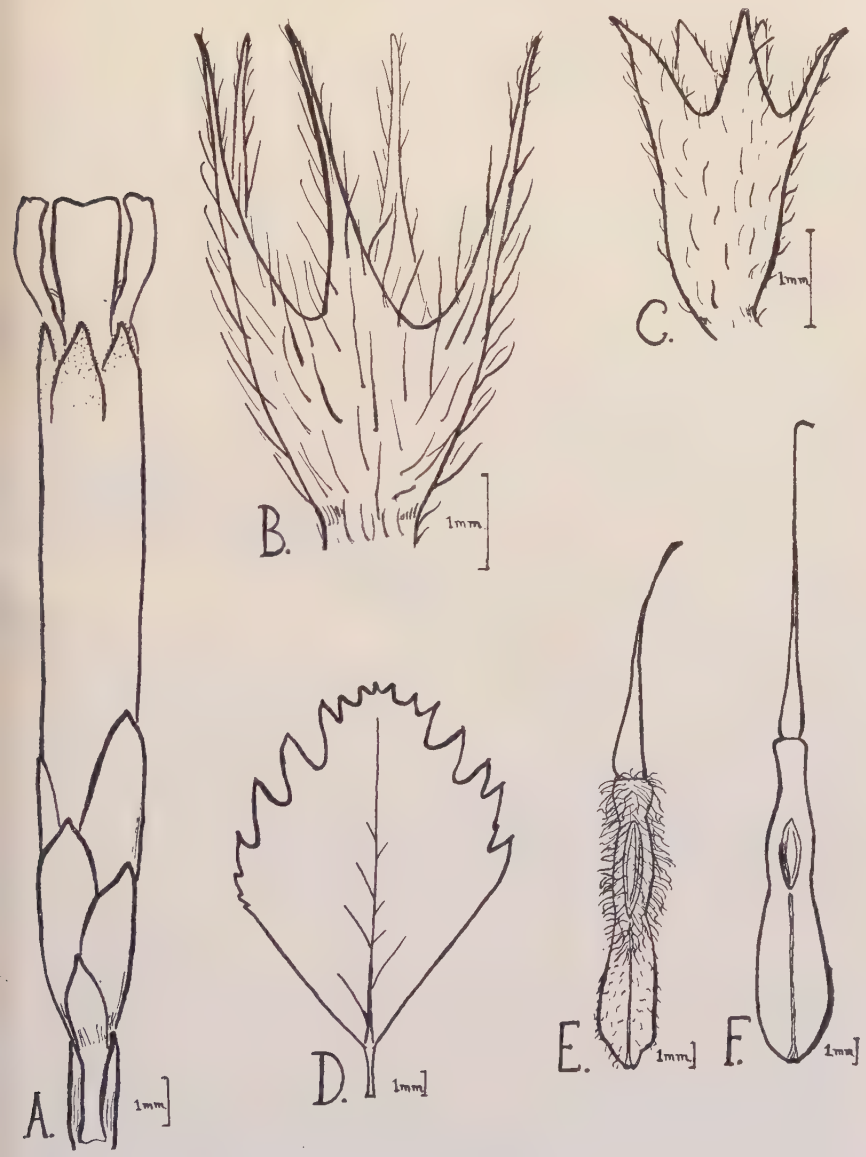


FIG. 1. A. *Dianthus siphonocalyx* Blakelock ; flower.
B. *Trigonella uncinata* Banks et Sol. var. *macroglochin* (Sirj.) Eig ; calyx.
C. *Trigonella brevidentata* Blakelock ; calyx.
D. *Medicago hispida* Gärtn f. *serratifolia* Blakelock ; leaflet.
E. *Isatis guestii* Blakelock ; young silicula.
F. *Isatis glabrisiliqua* Blakelock ; young silicula.

18.4.32, 2054 ; Zakho Pass, 750 m., on the mountainsides, 25.4.32, 2269 ; Acra, 450–900 m. ?, fodder plant, native name haspink (K.), mid-Apr. 32, *Qaimaqam of Acra* 3086.

L. erectus *Lag.*

Qizil Robat, at edge of a cornfield, 30.3.32, 1882.

L. sativus *L.*

Rustam, in a linseed field, commonly found as a weed in winter crops, also fairly extensively cultivated as a pulse, native name hurtuman, 7.5.32, *Yussef Lazar* 3422 ; Baghdad, in fields, 25.4.33, *Yussef Lazar* 3903.

Lathyrus sp.

Rustam, imported, " New Zealand Grass Tea", Apr. 1930, 233 ; nr. Sulaimaniya, on " daim " (unirrigated cultivated) land throughout the province, spring plant eaten by all animals, native name polka lasura, 15.4.32, *Gowan* 2416.

These specimens are neat to *L. sativus* L. but have not been accurately determined in the absence of fruits.

Medicago ciliaris (*L.*) *Krock.*

Daltawa, in wet places, native name yanji or qurt, 26.5.32, 3080

Medicago hispida *Gärtn.*

Amadia, 1020 m., in cultivated fields in the valley, native name kadik, 27.3.31, 1243.

The fruits of this specimen are too young to give a varietal name.

M. hispida *Gärtn.* var. **apiculata** (*Willd.*) *Urb.* in Verh. Bot. Brandenb. **15**, 74 (1873).

Rustam, on channels, 12.3.31, 1154 ; Arbil Province, grazed by animals, native name kurt, May 33, *Mhd. al Radhi* 3873.

One specimen No. 3873 has the spines of the fruit much reduced, verging towards var. *confinis* Koch.

M. hispida *Gärtn.* var. **denticulata** (*Willd.*) *Urb.* l.c.

Nr. Felluja, on cultivated land, native name qarainah, 6.3.30, 978 ; Baghdad, in undergrowth of an orchard at Karada, native name lizaij, 3–13.4.32, 1941, 1998.

M. hispida *Gärtn.* f. **serratifolia** *Blakelock* f. nov., a typo foliis rhomboideo- obovatis margine triente vel dimidio superiore valde dentata (dentibus 1–1·5 mm. longis). (Fig. ID, p.415).

Rustam, on channels, 12.3.31, *Yussef Lazar* 1153.

The fruits are immature, but would probably have developed into those of var. *apiculata* (Willd.) Urb. Another specimen in Herb. Kew (Basra, 27.2.30, *Rogers*, 0444) appears to belong to this form, although the leaveteeth are not so acute.

M. laciniata (*L*) *Mill.*

Jabal Hamrin (nr. Table Mt.), 150 m., sandy soil, 28.3.32, 1830 ; Southern Desert, W. of Zubair, on sandy compact soil covered by small stones and grit, 8.4.33, *Guest, Eig and Zohary* 5021.

M. minima (*L.*) *Desr.*

Rowanduz Gorge, 450 m., 17.4.32, 2033 ; Khanaqin, 150 m., on stony hillside, 29.3.32, 1836 ; Kani Dolman hills, Kirkuk, 390 m., on dry rounded stony hilltop, 30.4.33, 4333 ; Kani Dolman hills, Kirkuk, 390 m., 30.4.33, 4358.

M. orbicularis *Bartal.*

Acra, 450–900 m., fodder plant, native name mataluk (K.), mid-Apr. 1932, *Qaimaqam of Acra* 3095 ; Shimal (Sinjar), native name nafal or gurt (K.), Apr. 32, *Mudir of Shimal* 3130.

M. radiata *L.*

Dohuk, in a cornfield, 25.4.32, 2298 ; Dohuk-Zakho, 450 m., in a cornfield, 25.4.32, 2303 ; Acra, 450–900. ? fodder plant, native name nivishtuk (K.), mid-Apr. 32, *Qaimaqam of Acra* 3096 ; Dohuk, native name matalushk (K.), 8.5.32, *Makki Beg* 3269.

M. rigidula (*L.*) *Desr.* (*M. gerardi* Willd.).

In Tanjero Valley (Sulaimaniya), on " daim " (unirrigated, cultivated) land throughout the province, eaten by all animals in the spring, native name danok, 16.4.32, *Gowan* 2398 ; Arl Gird Dagh (nr. Nawanda), 1800 m., 21.7.32, 2806.

M. rotata *Boiss.*

Dohuk, 450 m., in a cornfield on stony land, 23.4.32, 2158 ; Mosul, in wheatfield, 14.4.32, *Yussef Lazar* 3380.

M. sativa *L.*

Chia-i-Mandali (nr. Walash), 1050 m., by a stream, 18.7.32, 2670 ; Arl Gird Dagh, 1800 m., by a stream, 21.7.32, 2850 ; Arl Gird Dagh (nr. Rust), 1950 m., along the edge of a cornfield, 24.7.32, 2927 ; Zawita, 900 m., fodder plant, cultivated in gardens, native name winjah (K.), 27.7.33, 3758 ; Ser Amadia, 1770 m., on mountain slope, 3.8.33, 4980.

Melilotus indica (*L.*) *All.*

Baghdad, common in fields and orchards at Karada, native name qurt, 13.3.32, 7 ; Rustam, Apr. 30, 226 ; nr. Felluja, " khor " land among wheat, 6.3.31, 946 ; Rustam, Baghdad, in fields, native name qurt, 20.4.31, *Yussef Lazar* 1142 ; Tuz, 210 m., in cultivated fields, 4.4.31, 1421 ; Jazira Desert, used by Badouin girls to braid their hair, 20.4.33, *Edmonds* 3824.

M. officinalis *Desr.*

Arl Gird Dagh, 1800 m., by a stream, fl. bright yellow, 21.7.32, *Guest and Ludlow-Hewitt* 2813.

Onobrychis aequidentata *D'Urv.* subsp. **aequidentata** *Sirj.* f. **typica** Lindberg ex Sirj. in Publ. Fas. Sci. Univ. Mas. **56,** 41 (1925).

Zakho Pass, 750 m., 25.4.32, 2260.

O. bicolor *Bornm.*

Baba Gurgur, 3600 m., 1.5.33, 4386.

O. cornuta (*L.*) *Desv.*

Arl Gird Dagh, 3300 m., among rocks, dwarf shrub forming a spiny cushion, 22.7.32, 2882.

O. crista-galli (*L.*) *Lam.*

Khanzad Valley (nr. Arbil), 420 m., in a cornfield, 17.4.32, 2009 ; Ain Sifni (Mosul Liwa), 450 m., fodder plant, native name qara najuk (K.), 9.6.32, *Salim Effendi* 2563 ; Dohuk, native name si dadan (K.), 8.6.32, *Makki Beg* 3286 ; Balad Sinjar, 420 m., on roadside grazing strip, 28.4.33, 4109 ; Makhlat, 160 m., on open *Stipa* steppe, 29.4.33, 4261.

O. galegifolia *Boiss.*

Atrush (N. of Mosul), 900 m., on red marl banks near water, 13.7.33, 3650.

O. lanata *Boiss.*

Jabal Hamrin, 29.3.30, 691 ; Jabal Hamrin (nr. Table Mt.), c. 1500 m., 20.3.32, *Ludlow-Hewitt* 1675 ; Naft Khana, 150 m., on stony soil, dwarf shrublet, 29.3.32, 1852 ; Dohuk, native name halawuk (K.), 8.5.32, *Makki Beg* 3275 ; Jazira Desert, 20.4.33, *Edmonds* 3810 ; Ain-al-Husan (nr. Sinjar), 315 m., on open *Poa* steppe, 28.4.33, 4213 ; Kani Dolman hills, Kirkuk, 390 m., on dry stony rounded hilltop, 30.4.33, 4355.

Ononis reclinata *L.* var. **minor** *Moris* Fl. Sard. **1,** 422 (1837).

Mosul, on a hill, 23.4.32, *Yussef Lazar* 3384.

Onobrychis aff. **sirinae** Náb.

Jabal Darawishka, 240 m., stony ground, 28.3.32, 1761.

Our plant matches a specimen in Herb. Kew (Sulaimaniya, Apr. 20, *Graham* 60). The affinity of Graham's specimen was discussed by Sirjaev (in Bull. Soc. Bulg, **4,** 18 (1931)), who compared it with *O. sirinae* Nab. and *O. acaulis* Bornm., without, however, giving it a name. This form is intermediate between the two species, and possibly represents a hybrid between them. It resembles *O. acaulis* in the large flowers (12–16 mm. long), the calyx not accrescent, and vague (not secund) raceme, and *O. sirinae* in the undivided or trifoliate leaves, and the uniovulate ovary.

O. spinosa *L.* subsp. **leiosperma** (*Boiss.*) *Sirj.* ined.

Chia-i-Mandali (nr. Walash), 1050 m., by a stream, fls. pinkish, 18.7.32, 2665 ; Ser Amadia, 1500 m., on open hillside at the top of Gulli Mazurka, 3.8.33, 4997.

O. *aff.* **squarrosa** *Viv.*

Arbil, on top if " tel " (mound), 29.3.30, 624A ; Mosul, 270 m., in cultivated fields, 2.4.21, 1340A ; Zakho Valley, 600 m., 25.4.32, 2259 ; Acra, 450–900 m. ?, native name haishtaruk (K.), mid-Apr., 32, *Qaimaqam of Acra* 3101 ; Mosul, in a wheatfield, native name qutaib, 12.4.32, *Yussef Lazar* 3356 ; Kirkuk Province, useful grazing plant, native name pikul, 14.5.33, *Ali Effendi Hadari* 3939 ; Balad Sinjar–Tal Afar, 330 m., on roadside strip of grazing land, 28.4.33, 4146 ; Ain-al-Husan (nr. Sinjar), 315 m., on open *Poa* steppe, 28.4.33, 4221 ; Kani Dolman hills, 390 m., on dry rounded stony hilltop, 30.4.33, 4338.

Judged by the characters given by Sirjaev (in Publ. Fac. Sci. Univ. Masaryk, pp. 46–49, 1925), these plants are intermediate between *O. squarrosa* Viv. and *O. crista-galli* (L.) Lam.

Onobrychis sp.

Nr. Kirkuk, 300 m., on the road to Baba Gurgur oil wells (sandy soil), 4.4.31, 1367.

This number shows no fruiting material.

Oxytropis persica *Boiss.*

Siah Koh (Kurdistan), 3300 m., a very beautiful rock plant with small blue fls., Aug. 31, *Ludlow-Hewitt* 2373 ; Arl Gird Dagh, 3000–6003 m., on barren rocky ground, varies from mauve to reddish purple, 22.7.32, 2890.

Parkinsonia aculeata *L.*

Basra (Kut-us-Sayyid garden), alien, grown from imported seed, Apr. 31, *Dowson* 1639.

Phaseolus mungo *L.*

Hafriya (Kut Liwa), cultivated, native name mash, 8.10.30, 1033.

Pisum arvense *L.*

Gwezha (Sulaimaniya), on " daim " (unirrigated land) throughout the province, spring plant of great value to all animals and for human consumption, native name polka phatuna, 18.4.32, *Gowan* 2415.

Prosopis farcta (*Banks. et Sol.*) *Eig* (*P. stepheniana* (M.B.) Kunth).

Rowanduz Gorge, 750 m., native name kharnub, 12.10.31, 490 ; Rustam, everywhere, native name shok, 30.5.32, 5.7.32, *Yussef Lazar* 3439 ; Atrush, Kurdistan, 900 m., on red marl banks in open pine forest, 4401.

P. glandulosa *Torr.*

Rustam, Oct. 29, 314 ; Basra, Kut-us-Sayyid garden, probably not indigenous, Apr. 31, *Dowson* 1559.

P. juliflora *DC.*

Garden at Basra (said to have come from America), Oct. 29, 287 ; Rustam, Oct. 29, 314 ; Basra, Kut-us-Sayyid garden, probably not indigenous, Apr. 31, *Dowson* 1559, 1641.

Scorpiurus sulcata *L.*

Rustam, 2.6.31, *Yussef Lazar* 1188 ; Daltawa, very common in cornfields, said by the local shepherds to be one of the most useful pls. for grazing sheep, native name khuzaimah, 29.4.32, 26.5.32, *Guest and Darwish Hadari* 2447 ; Ain Sifni (Mosul Liwa), 450 m., excellent fodder plant, native name mamitak (K.), 8.6.32, *Salim Effendi* 2552 ; Mosul, in a wheatfield, native name karainah, *Yussef Lazar* 3406 ; Baghdad, on channels at Rustam, native name hassar, 25.4.33, *Yussef Lazar* 3883 ; Kani Dolman hills, Kirkuk, 390 m., on dry stony rounded hilltop, 30.4.33, 4324.

Securigera securidaca (L.) Deg. et Dörfl.

Baghdad, in undergrowth of an orchard at Karada, 3.4.32, 1942.

Sesbania aegyptiaca *Pers.*

Rustam, Oct. 29, 279.

Sophora japonica *L.*

Baghdad (Harathiya Estate), tree 30 ft. high, well-grown, 14.7.32, 3236.

Trifolium alexandrinum *L.*

Rustam, from imported seed, Apr. 30, 236.

T. campestre *Schreb.*

Nr. Altun Kopri, 240 m., at edge of a stream, 16.4.32, 1972 ; Zawita Gorge, 900 m., on grassy slopes above the gorge, 23.4.32, 2223 ; Ain Sifni, nr. Shaikhan, 450 m., good fodder plant, native name nafal asfar, 8.6.32, *Salim Effendi* 2549 ; Acra, c. 450–900 m., fodder plant, native name nafal zar (K.), mid-Apr. 32, *Qaimaqam of Acra* 3082 ; Dohuk, useful for sheep, native name nafal zar (K.), 8.6.32, *Makki Beg* 3287, 3288 ; Kirkuk Prov., useful grazing plant, native name yungah, 14.5.33, *Ali Effendi Hadari* 3953 ; Makhlat, 185 m., on open *Stipa* steppe, 29.4.33, 4257.

T. echinatum *M.B.* (*T. supinum* Savi).

Daltawa, along ditches, native name nifil abyadh, 26.3.32, 2449 ; do., in marshy places, fls. red and white, native name nifil, 26.3.32, 3079.

T. fragiferum *L.*

Daltawa, in wet places, native name nifil, 26.5.32, 3078.

Fig. 2. A. *Trifolium radicosum* Boiss. et Hoh. ; calyx.
B. *Trifolium guestii* Blakelock ; calyx.

Trifolium guestii *Blakelock* sp. nov. (§*Trifoliastrum* Ser.) ; a *T. radicoso* Boiss. et Hoh. calyce glabro et calycis dentibus anguste triangularibus ; a *T. parvulo* Beck stipulis haud acuminatis, foliolis floribusque majoribus differt. (Fig. IIB, p.420).

Radix perennis, verticalis, crassa, usque 20 cm. longa. *Caules* dense caespitosi, glabri vel minute pubescentes, 0·5–2 cm. alti. *Stipulae* ovato-triangulares, apice obtusae, inferiores (ut vaginae) marcescentes albo-membranaceae, superiores albo-membranaceae nervis viridibus. *Petioli* usque 2 cm. longi. *Foliola* obovata, obtuse dentata, basi cuneata, utrinque glabra, 3–10 mm. longa, 2–6 mm. lata. *Pedunculi* glabri vel minute pubescentes, 5–25 mm. longi.*Capitulum* globosum, c. 1–15 cm. latum, bracteis lanceolatis albo-membranaceis costis viridibus. *Pedicelli* in anthesi usque 1 mm. longi, glabri. *Calyx* campanulatus, 10-nervius, glaber, fauce glabro, tubo 2 mm. longo, dentibus anguste triangularibus 1·5–2 mm. longis. *Corolla* rosea vel purpurea (?) ; vexillum 8–8·5 mm. longum ; carina alaeque vexillo breviores, carina alis brevior. *Ovarium* biovulatum, glabrum. *Legumen* ignotum.

N. 'IRAQ. Arl Gird Dagh, 3000 m., on grassy places by a lake, 22.7.32, *E. Guest* 2854 (type) ; do., 3300 m., on a damp grassy slope, 22.7.33, *do.*, 2894.

The corollas are much faded, but show signs of having been either pink or purple, or at least tinged with one of these colours. *T. parvulum* Beck is described as having leaflets 3 mm. long and a corolla 5 mm. long (ex Stapf in Denschr. Akad. Wien II, 35 (1886)).

T. physodes *Stev.*
Nr. Amadia, fodder plant, 32, *Majid Mustafa* 3599.

T. pratense *L.*
Chia-i-Mandali, 1350 m., in a cultivated field, 20.7.32, 2754 ; Arl Gird Dagh, 2100–2700 m., by streams, 21.7.32, *Guest and Ludlow-Hewitt* 2843.

T. purpureum *Lois.*
Ain Sifni (Mosul Liwa), 450 m., on follow land, of medium feeding value, native name nafal (K.), 9.6.32, *Salim Effendi* 2560.

T. repens *L.*
Ain Sifni (Mosul Liwa), 450 m., good fodder plant, native name nafal abyadh, 8.6.32, *Salim Effendi* 2551 ; Arl Gird Dagh, 2700 m., in wet marshy patches by a lake, fls. white, 24.7.32, 2960 ; Dohuk, native name nafal spi (K.), 8.6.32, *Makki Beg* 3290.

Nos. 2551 and 3290 do not show the underground portion of the plant and may belong to an annual species.

T. resupinatum *L.*
Mandali, May 30, 896 ; nr. Altun Kopri, 240 m., at the edge of a stream, 16.4.32, 1973 ; Daltawa, on edge of marshy patches, eaten by horses, etc., native name nifil, 26.3.32, 2448 ; Shaikhan (Mosul Liwa) on "daim" land, good fodder plant, native name nafal ammar, 8.6.32, *Salim Effendi* 2550 ; Makhlat, 180 m., on open *Stipa* steppe, 29.4.33, 4259.

T. rytidosemium *Boiss. et Hoh.*
Arl Gird Dagh, 1800 m., by a stream, bright yellow fls., 21.7.32, 2851 ; do., 2700 m., in wet marshy patches by a lake, yellow fls., 24.7.32, 2962.

T. scabrum *L.*
Acra, 450–900 m., fodder plant eaten by sheep, etc., native name nifil, Apr. 32, *Qaimaqam of Acra* 3081A.

T. spumosum *L.*
Dohuk, useful for sheep, native name nafal sur (K.), 8.6.32, *Makki Beg* 3289.

T. stellatum *L.*
Rowanduz Gorge, 450 m., on a grassy slope under a cliff, 17.4.32, 2026 ; Acra, 450–900 m., in fields in the hills and on the plain, fodder plant eaten by cattle and sheep, native name nafal rashk (K.), mid-Apr. 32, 3081 ; Kani Dolman hills, Kirkuk, 390 m., on dry rounded stony hilltop, 30.4.33, 4334.

T. tomentosum *L.*
Rustam, 20.4.31, *Yussef Lazar* 1173 ; Qaraghan, on marshy flats by the Diyala River, 30.3.33, 1876 ; Acra, c. 450–900 m. ?, native name nafaluk (K.), mid-Apr. 32, *Qaimaqam of Acra* 3106 ; Dohuk, nafal sur (K.), 8.6.32, *Makki Beg* 3291 ; Arbil Province, grazed by livestock, native name kurt, May 33, *Mhd. al Radhi* 3874 ; Makhlat, 180 m., on open *Stipa* steppe, 29.4.33, 4258.

Trigonella anguina *Forsk.*
Nr. Mahmudiya (Latifiya Estate), near a channel on barren land (seed undoubtedly brought down by flood water), native name qurt, 16.5.32, 2387.

T. aurantiaca *Boiss.*
Nr. Mandali, Ab-i-Naqt, 9.5.30, 917 ; Ain Ghazal, 360 m., in a field, 28.4.33, 4088 ; Makhlat, 180 m., on open *Stipa* steppe, 29.4.33, 4255A.

Trigonella brevidentata *Blakelock* sp. nov. (Sect. *Bucerates* Boiss., Ser. *Sessiles* Sirj.); a *T. uncinata* Banks et Sol. et *T. noëana* Boiss. calycibus subminoribus dentibus triangularibus tubo brevioribus ; a *T. retrorsa* Boiss. leguminibus erecto-patentibus longioribus, apice hamatis distinguitur. (Fig. IC, p.415).

Herba annua, ± erecta, basi ramosa, 6–14 cm. alta. *Caules* ± crispato-pilosi. *Stipulae* triangulares, semisagittatae. *Foliola* obovata, dentata, apice retusa, glabra vel subtus parce pilosa, 2–11 mm. longa, 2–9 mm. lata. *Pedicelli* 1·5–3 mm. longa, fructiferi incrassati. *Flores* solitarii ; calyx pilosus, 2–3 mm. longus, dentibus triangularibus 0·5–1 mm. longis, tubo 1·5–2 mm. longo ; corolla flava ; vexillum obovatum 5–7 mm. longum ; carina alaeque vexillo breviores. *Legumina* linearia, subteretia, recta vel subarcuata, apice hamata, erecto-patentia, reticulato-nervosa, areolis angustissimis subcontiguis longitudinaliter ornata, glabra vel glabrescentia, 4·5–6·3 cm. longa, 1·5–2 mm. lata. *Semina* oblique subcylindrica, minute tuberculata, brunnea nigro-punctata, c. 2 mm. longa, 1 mm. lata.

N. 'IRAQ. Tal Afar, 375 m., in a field on hard friable soil, 26.4.33, *Guest, Eig and Zohary* 5116.

Two gatherings in Herb. Kew not in Guest's collection also belong to this species.

N. 'IRAQ. Qaiyara, Mosul, 192 m., abundant on waste ground, etc., except where soil is very saline, 1939, *B. E. Bayliss* 54.

PERSIA. Near Isfahan, 1500 m., field, Apr. 1941, *A. C. Trott* 845 (type).

This plant shows a strong superficial resemblance to *T. uncinata*. Banks et Sol. var. *macroglochin* (Sirj.) Eig (*T. monantha* C. A. M. var. *macroglochin* Sirj.), especially in the erect pods hooked at the apex. Our species, however, has triangular calyx teeth 0·5–1 mm. long (not subulate, 1·5–4 mm. long, at least as long as the calyx tube) ; it is also less hairy in all parts and has retuse wider leaflets. The leaf shape and density of indumentum vary in *T. uncinata*, and these two latter characters may prove to be less constant.

T. noëana Boiss. and *T. orthoceras* Kar. et Kir. var. *anatolicus* Boiss. differ in the unhooked legumes having the transverse berves more conspicuously developed than in *T. brevidentata*. *T. noeana*, also, has subulate calyx teeth.

T. retrorsa Boiss. from Afghanistan has triangular calyx-teeth, but is clearly distinguished by the shorter pods (3–5 cm. long) which are not hooked at the apex and are horizontally deflexed.

Another *Trigonella* from 'Iraq is described here, although not represented in Mr. Guest's collection—

T. orthoceras Kar. et Kir. var. **baylissi** *Blakelock* var. nov. ; a typo foliolis pinnatisectis, calycis dentibus triangularibus tubo subbrevioribus, leguminibus subbrevioribus 1·5–2·5 cm. longis, c. 2 mm. latis differt.

N. 'IRAQ. Qaiyara, Mosul, 192 m., common in fairly good soil associated with *Stipa tortilis* Desf., *Astralagalus cruciatus* Link., *Malva parviflora* L., *Trigonella noëana* Boiss., *T. brevidentata* Blakelock, etc., 1.5.39, *Miss B. E. Bayliss* 134A.

T. coelesyriaca *Boiss.*

Amadia, 1020 m., in fields in the valley, native name nifil, 27.3.31, 1242 ; Mosul, 270 m., 1.4.31, 1281 ; Dohuk, 450 m., common in cultivated fields, 1.4.31, 1312 ; Arbil, 375 m., common in cultivated fields, 2.4.32, 1457 ; do., in cornfield, 21.4.32, 2165 ; Dohuk, 450 m., in a cornfield on stony land, 25.4.32, 2306 ; Mosul, in a wheatfield, native name nafal, 12.4.32, *Yussef Lazar* 3334, 3335.

T. foenum-graecum *L.*

Rustam, from imported seed, Apr. 30, 234.

T. foenum-graecum *L.* var. **haussknechti** Sirj. in Publ. Fac. Sci. Univ. Masaryk **5,** 32 (1932).

Diana, nr. Rowanduz, 26.3.30, 725 ; Dohuk, 450 m., cultivated fields, 1.4.31, 1609.

T. noëana *Boiss.*
Jabal Hamrin (nr. Table Mt.), on sandy soil, 30.3.32, 1905 ; Dohuk, 450 m., in a cornfield, 2304 ; Ain-al-Husan (nr. Sinjar), 315 m., on open *Poa* steppe, 28.4.3, 4220 ; Makhlat, 180 m., on open *Stipa* steppe, 29.4.33, 4255.

T. stellata *Forsk.*
Southern Desert, W. of Zubair, on compact sandy soil covered by small stones and grit, 8.4.33, *Guest, Eig and Zohary* 5023.

T. strangulata *Boiss.*
Zawita Gorge, 900 m., 23.4.32, 2225.

T. uncinata *Boiss. et Noë.*
Mahmudiya, Arabic name qurt, 22.5.30, 925 ; Hinaidi, on channels, 30.3.31, *Yussef Lazar* 1156 ; Nasiriya, in irrigated fields and gardens, eaten by livestock in general, native name gurt, 15.4.32, *'Abd-ar-Raziq Barbuti* 2534 ; Baghdad, in fields at Rustam, native name akrainah or gurt, 25.4.33, *Yussef Lazar* 3904.

Trigonella sp.
Dohuk, 450 m., in a cultivated field, on a grassy bank, 1.4.31, 1287, 1292.
These specimen show no fruits.

Vicia aintabensis *Boiss. et Haussk.* e descr.
Gwezha (Sulaiminiya), on mountainsides throughout the province, spring plant eaten by all animals, native name polka mezhord, 23.4.32, *Gowan* 2419.

V. angustifolia *Roth.*
Rustam, growing on a lawn, 11.4.32, 2000.

V. amphicarpa *Dorthes.*
Mosul, 270 m., in cultivated fields, 2.4.31, 1340 ; Makhlat, 165 m., among rocks under a cliff, 29.4.33, 4271 ; between Mosul and Tal Afar in association of *Centaurea behen*, 26.4.33, *Guest, Eig and Zohary* 5112.
V. articulata *Hornem.* (*V. monanthos* (L.) Desf., non Retz) det. B. L. Burtt.
Rustam, Apr. 40, 228.

V. calcarata *Desf.*
Rustam, Apr. 30, 254 ; Rustam, on banks of channels, this may be an escape from cultivation since various types of vetch were grown here some years ago, 10–12.3.31, *Yussef Lazar* 1124 ; Baghdad, on channels in fields at Rustam, native name hub-ad-dharait, 22.3.33, *Yussef Lazar* 3921.

V. ciceroidea *Boiss.*
Chia-i-Mandali, 2750 m., among rocks, 19.7.32, 2717 ; Arl Gird Dagh, 3300 m., 22.7.32, *Guest and Ludlow-Hewitt* 3055.
The two gatherings have the leaflets and stipules more reduced than in the type number in Herb. Kew.

V. dasycarpa *Ten* (*V. varia* Host.).
Rustam, Apr. 30, 230 ; do., 16.5.31, *Yussef Lazar* 1185.

V. gregaria *Boiss. et Heldr.*

Nr. Arl Gird (Kurdistan), 3000–3600 m., common on the high hills, about 2 ft. high, Aug. 31, *Ludlow-Hewitt* 2375 ; Chia-i-Mandali (Rowanduz Area), 2400–1700 m., in couloirs under melting snow drifts, thus forming dark green conspicuous ribs near the top of the mountain, beautiful bluish flowers, said to be poisonous or unpalatable and consequently untouched by stock, 20.6.32, 2716 ; Arl Gird Dagh, 2700 m., blue to purple vetch, growing in clumps and patches (with an occasional pl. with pinkish fls.), 24.6.32, 2957.

V. hybrida *L.*

Zawita, 900 m., 23.4.32, 2220.

V. narbonensis *L.*

Dohuk-Mosul, 300–450 m., in cultivated fields, 1.4.31, 1288 ; Qizil Robat, in a cornfield, native name hab-adh-dhurat, 28.3.32, 1766 ; Dohuk, 450 m., in a cornfield on stony land, 21.4.32, 2160 ; Sulaimaniya, on daim (unirrigated, cultivated) land throughout the province, spring plant of great value to all animals, native name polka gaana, 17.4.32 *Gowan* 2414.

Some of these plants verge towards *V. serratifolia* Jacq.

V. noëana *Reut.*

Diana (nr. Rowanduz), 600 m., 30.4.32, *Ludlow-Hewitt* 2353.

V. palaestina *Boiss.*

Rowanduz Gorge, 750 m., in the spray of a waterfall, 18.4.32, 2053.

V. peregrina *L.*

Tuz, 210 m., fl. crimson red, 1391 ; Jabel Hamrin (nr. Table Mt.), 150 m., on dry sandy soil, 30.4.32, 1901 ; Zakho Pass, 750 m., on the mountainside on banks of loose soil, 25.4.32, 2274 ; Kirkuk Province, useful grazing plant, native name karainah, 13.5.33, *Ali Effendi Hadari* 3935 ; Ain Ghazal (Mosul Province), 360 m., in a field, 28.4.33, 4076 ; Balad Sinjar–Tal Afar, 330 m., on roadside strip of waste land, 28.4.33, 4138.

V. sativa *L.*

Mandali, in a cornfield, purplish red, 26.3.32, 1805 ; Baghdad, in an orchard at Karada, purplish-pink, native name hub-udh-dharat, which in vulgar parlance means " seed of shit", is said to be given owing to the purgative properties of the plant, 13.4.32, 1994 ; Dohuk, 450 m., in a cornfield on stony land, 25.4.32, 2300 ; Dolosur (Sulaimaniya), on " daim " land throughout the province, spring plant eaten by all animals, 15.4.32, *Gowan* 2418 ; Acra, c. 450–900 m., fodder pl., native name lantkai qili (K.), mid.-Apr. 32, *Qaimaqam of Acra* 3089.

V. serratifolia *Jacq.*

Nr. Felluja, cultivated land, native name hab-al-darait, 6.3.30, 961.

V. tenuifolia *Roth* ?

Dolosur (Sulaimaniya), on mountainside among oak trees, spring pl. great value for all animals, native name mezhord, 17.5.32, *Gowan* 2412 ; Ser Amadia, 1800 m., native name talik or tulk (K.), 32, *Majid Mustapha* 3598.

Neither of these numbers show fully expanded fls. or fruits, and their identification is therefore doubtful.

V. villosa *Roth.*

Rustam, imported seed, Apr. 30, 229 ; Chia-i-Mandali, 1950 m., in a cornfield, fls. bright blue, 20.7.32, 2743.

ROSACEAE

Agrimonia eupatoria *L.*

Chia-i-Mandali, 1350 m., in a cultivated field, 20.7.32, 2753.

Amygdalus carduchorum *Bornm.* ?

Jabal E.N.E. of Seri Hassan Beg, 1800–2100 m., on the mountainside, shrub (wild almond), 24.7.32, 2915.

This plant differs from *A. elaeagnifolia* Spach. var. *kotschyi* (Boiss. et Hoh.) Boiss. in having a less dense tomentum on the leaves. There are neither fls. nor fruits.

A. communis *L.*

Rustam, in orchards, ornamental shrub (grown for fruit in northern 'Iraq), native name toz, 29.2.32, 3315.

A. spartioides *Spach.*

Shaqlawa, Kurdistan, 23.3.30, 563 ; Jabal Hamrin, nr. Table Mt., 22.2.31, *Ludlow-Hewitt* 1071 ; Amadia (Kurdistan), 1050 m., low shrub growing on rocks, the fruit is said to be eaten, 28.3.31, 1264 ; Dohuk, 450 m., on a rocky cliff, 21.4. 32, 2172 ; Jabal Rubal, S. of Atrush, 769 m., rocky limestone slope (oak forest), 14.7.33, 3655 ; Shaikh Adi gorge, 769 m., on limestone rocks, 14.7.33, 4408 ; Zawita, 923 m., on old abandoned vineyard, 1.8.33, 4888 ; Altun Kopri (Kani Dolman hills, nr. Zab), 210 m., on sandstone slabs, 16.4.33, *Guest, Eig and Zohary* 5108 ; from a dry wadi in the desert 30 miles W. of Ramadi, 3.4.33, *Guest, Eig and Zohary*, s.n.

Cerasus brachypetala *Boiss.* (*C. incisa* Boiss.) var. *bornmuelleri C. Schneid.* Ill. Handb. Laubholzk, **1,** 604 (1906).

Chia-i-Mandali, 2100–2700 m. on rocks, small flat shrub with pretty pinkish red fls. and red berries, growing firmly pressed against rock surface, 19.7.32, *Guest and Ludlow-Hewitt* 2712.

Collingwood Ingram places this under *Prunus prostrata* Labill. var. *brachypetala* (Boiss.). Ingram (Gard. Chron. ser. 3, **120,** 139 (1946)).

C. tortuosa *Boiss. et Haussk.*

Pirmum Pass (Kurdistan), 750 m., common shrub with pinkish-white fls., 22.3.30, 558 ; Toweit Valley, May 30. *Paterson* 848 ; Marmarut Mt. (nr. Rowanduz), 900 m., fairly common on the mountainsides, 19.4.32, 2058 ; Shaikh Adi Gorge, 750 m., on limestone rocks, 14.7.33, 4412 ; Zawita, 825 m., on red marl banks, 25.7.33, 4427 ; do., 1200 m., rocky plateau, 28.7.33, 4584 ; do., 896 m., in oak forest on stony slope, 30.7.33, 4802 ; do., on rocky slope, 825 m., 30.7.33, 4819 ; do., in open forest, 1184 m., 30.7.33, 4846 ; do., 1262 m., in open oak forest, 30.7.33, 4862 ; do., in oak forest on steep rocky slope, 1138 m., 28.7.33, 4610 ; Zawita, 1140 m., in pine forest, 29.7.33, 4721.

Sometimes regarded as a variety of *C. microcarpa* Boiss.

Cotoneaster nummularia *F. et M.*

Zawita, 1050 m., on rocky limestone slope (N.) in a pine forest, shrub or small tree, native name gaiz baluk (K.), 27.7.33, 4518 ; do., 870 -1140 m., 28–30.7.33, 4662, 4708, 4781, 4803.

Crataegus azarolus *L.*

Chia-i-Mandali (Walash to Walza), 1500–1800 m., on the mountain side, a few large trees, 18.7.32, 2659 ; Shaikh Adi (N. of Mosul), 750 m., on the hillside, 14.7.33, 3665 ; Atrush, Kurdistan, 885 m., on red marl banks in open pine forest, 13.7.33, 4406 ; Zawita, 1110 m., rocky slope (limestone) in pine forest, 27.7.33, 4497 ; Zawita, 1050 m., on rocky slope, 28.7.33, 4648 ; do., 1020 m., on red limestone scree soil, 29.7.33, 4741 ; do., 1230 m., in open oak forest, 30.7.33, 4857 ; do., 870 m., on red marl banks, 1.8.33, 4880 ; do., 900 m., an old abandoned vineyard, 1.8.33, 4893 ; do., 982 m., in oak forest on rocky slope, 1.8.33, 4910; Ser Amadia, 1500 m., on open hillside at top of Gulli Mazurka, small trees, 3.8.33, 4993.

C. heterophylla *Fluegge.*

Rowanduz Gorge (Kurdistan), 600 m., 12.10.31, 492 ; Shaikh Adi (N. of Mosul), 825 m., 10.10,31, 1647 ; Rowanduz Gorge, 600 m., near a waterfall, 18.4.32, 2098 ; Shaikh Adi, 750 m., by a stream, 14.7.33, 3664.

Nos. 492, 1647 show leaves verging towards those of *C. monogyna.*

Geum urbanum *L.*

Shaqlawa, 840 m., in a shady orchard, 17.7.32, 3011.

Neurada procumbens *L.*

Southern Desert, W. of Zubair, on compact sandy soil covered by small stones and grit, 8.4.33, *Guest, Eig and Zohary* 5025.

Prunus armeniaca *L.*

Rustam, in orchards, cultivated for fruit all over 'Iraq, the commonest fruit tree after the date and orange, native name mish-mish, 29.2.32, 3316.

P. divaricata *Led.*

Shaglawali, Kurdistan, 23.3.30, 576A ; Jindian, nr. Rowanduz, in sheltered situation by a spring issuing from a cave, 25.3.30, 723 ; Rowanduz Gorge, 600 m., fair sized tree by a waterfall, 18.4.32, 2088 ; Qarmat Ali, nr. Basra, young tree with erect branches like a plum, 4.3.34, *Dowson* 5013.

The last number appears to be a cultivated form of *P. divaricata* with larger fruits.

P. domestica *L.*

Rustam, cultivated fruit tree, widely cultivated in 'Iraq for fruit, native name qaujah (greengage), 29.2.32, 2378.

Potentilla hirta *L.*

Jabal, E.N.E. of Seri Hassan Beg, 1950 m., by a stream, 24.7.32, 2911.

P. hirta *L.* var. **pedata** (*Willd.*) *Koch.* Syn. ed. 1, 214 (1835).

Chia-i-Mandali (nr. Walza), 1950 m., on stony ground in a cornfield, 20.7.32, 2742 ; Arl Gird Dagh (nr. Nawanda), 1800 m., by a stream, 21.7.32, 2804.

P. reptans *L.*

Arl Gird Dagh, 1800 m., in wet places by a stream, fls. a magnificent orange colour, 21.7.32, *Guest and Ludlow-Hewitt* 2836.

P. supina *L.*

Mahmudiya, 22.5.30, 924 ; Baghdad, from ditches in a cotton field (Harathiya Estate), 14.7.32, 3224.

Poterium verrucosum *Ehrenb.*

Zakho Valley, 600 m., in rocky cleft, 25.4.32, 2267.

P. villosum *S. et S.*

Marmarut Mts. (nr. Rowanduz), 900 m., on stony mountain side, 19.4.32, 1699 ; Arbil, in cornfield on red loam, 20.4.32, 2129 ; Tal Kaif, c. 300–600 m., useful for sheep grazing, native name kafshah or sha'fah, Apr.–May 32, *Mudir of Tal Kaif* 3209 ; Mosul, in a wheatfield, 9.4.32, *Yussef Lazar* 3390 ; Arbil Province, grazed by livestock, native name ziwan-al-barriyah, May 33, *Mhd. al Radhi*, 3609 ; Zawita, 840 m., 25.7.33, 3692 ; Atrush, Kurdistan, 885 m., on red marl banks in open pine forest, 13.7.33, 4389.

Pyrus communis *L.*

Seri Hassan Beg, 1800 m., on the hillside among oak trees, wild pear tree about 20 ft. high, 24.7.32, 3026 (3338).

P. malus *L.*

Rustam, in orchards, cultivated for fruit (apple), native name tuffam, 29.2.32, 2839.

P. syriaca *Boiss.*

Rowanduz Gorge (Kurdistan), 600 m., growing in a place which was quite inaccessible 3–4 years ago, native name 'armut, 12.10.31, 494 ; Rowanduz, 26.3.30, 585 ; Ryatt Valley (foot of Arl Gird Dagh), 1050 m., by a stream, wild pear tree, 20.7.32, 2749.

Rosa canina *L.*

Rowanduz Gorge (Kurdistan), 600 m., 12.10.31, 491.

R. dumetorum *Thuill.*

Chia-i-Mandali, 1350 m., in a village by a stream, 20.7.32, 2764 ; Walash to Nawanda, 1050 m., by a stream in the valley, 20.7.32, 2774.

Rubus sanctus *Schreb.* (*R. anatolicus* Focke).

Rowanduz Gorge (Kurdistan), 600 m., in the bed of the stream, 12.10.31, 457 ; Suwara-Tukka (Kurdistan), 1200 m., at edge of a spring, 10.10.31, 1580 ; Daltawa, in date gardens, native name alqah, 26.3.32, 2430 ; Chia-i-Mandali, 1350 m., in hedgerows near a village, 20.7.32, 2760 ; Zawita, 870 m., on red marl banks, 1.8.33, 4874.

Saxifragaceae

Saxifraga hederacea *L.*

Rowanduz Gorge, 750 m., on rocks by a waterfall, 18.4.32, 2052.

S. sibirica L. var. **eusibirica** *Engl. et Irmsch.* Pflanzenr. **4,** 117, 264 (1919).

Arl Gird Dagh, 2850 m., among rocks by a spring, 24.7.32, 2964 ; Arl Girt (Kurdistan), 3300 m., under rocks in wet places Aug. 31, *Ludlow-Hewitt* 1519.

No. 1519 shows only leaves, and the determination is therefore doubtful.

CRASSULACEAE

Sedum tenellum *MB.*

Arl Gird Dagh, 3300 m., on rocks, 21.7.32, *Guest and Ludlow-Hewitt* 3047.

Umbilicus intermedium *Boiss.*

Makhlat, 165 m., among rocks under a small cliff, 29.4.33, 4275 ; Jindian nr. Rowanduz, 750 m., on vertical cliffs above Sayyid Taha's cave, 17.4.33, *Guest, Eig and Zohary* 5109.

U. libanoticus (*Labill.*) *DC.* var. **steudelii** *Boiss.* Fl. Or. **2,** 772 (1872).

Chia-i-Mandali, 2400 m., on a cliff, 19.7.32, 2802 ; Shaikh Adi, 900 m., on a wall, decoction of dried fls., or fr. is used as a cure for rheumatism, native name hai-al-alam, 15.7.33, 3681.

No. 2802 has 1–3-flowered inflorescences, about 4 cm. high. It might be referred to var. *pauciflorus* Buser or f. *minor* Nábělek.

U. tropaeolifolius *Boiss.*

Rowanduz Gorge, 18.4.32, 2096.

Umbilicus sp.

Jindian, nr. Rowanduz, Kurdistan, Mar. 30, 739 ; do., 769 m., on vertical cliff faces, 17.4.33, *Guest, Eig and Zohary* 5110.

Both these numbers show only the leaf-rosettes and bases of the old flowering stems. Probably *U. libanoticus* (Labill.) DC var. *glaber* Boiss.

COMBRETACEAE

Quisqualis indica *L.*

Garden at Basra, Oct. 29, 297.

MYRTACEAE (det. V. S. Summerhayes).

Callistemon citrinus (*Curtis*) *Stapf* (*C. lanceolatus* DC.).

Baghdad, a tree, probably not indigenous, 24.11.31, 468. A native of Eastern Australia.

Eucalyptus bicolor *A. Cunn. ex Hook* in Mitchell, Journ. Trop. Austral. 390 (1848).

Rustam, in an avenue along an irrigation ditch, tall tree 9–12 m. high, 25.10.32, 3464.

A native of eastern Australia.

E. camaldulensis *Dehnh.* Cat. Pl. Hort. Camald, ed. 2, 20 (1832) (*E. rostrata* Schlechtend. in Linnaea **20,** 655 (1847)).

Rustam, in garden, Apr. 1930, 243 ; same locality, on a lawn, tall tree 9 m. high, with luxuriant pendulous branches almost hiding the trunk, 25.10.32, 319A ; same locality, Feb. 1931, 1091, 1092, 1093.

A native of Australia.

E. coolabah *Blakely and Jacobs* in Blakely, Key Eucalyptus, 245 (1934).
Rustam, in small plantation, small tree 6 m. high, 26.10.32, 3463.
A native of Australia.

E. griffithsii *Maiden* in Journ. Nat. Hist. & Sci. Soc. W. Austral. **3,** 177 (1911).
Rustam, garden, Apr. 1930, 242 ; same locality, Feb. 1931, 1095.
A native of Western Australia.

E. lesouefii *Maiden*, Ait. Rev. Eucalypt. **2,** 187 (1912).
Rustam, Feb. 1931, 1094, 1098.
A native of Western Australia.

Lythraceae

Ammannia sp. ?
Nr. Felluja (on edge of low-lying land), native name hamqah, 6.3.30, 937.
This specimen shows neither fls. nor fruits.

Lythrum hyssopifolium *L.*
Daltawa, in a marsh, fls. purplish red, 26.5.32, 2442.

L. salicaria L. var. **tomentosum** (*Mill.*) *DC.* Cat. Hort. Monsp. 123 (1813).
Rowanduz Gorge (Kurdistan), 600 m., on rocks, fls. purplish red, 12.10.31, 1594 ; Chia-i-Mandali (nr. Walash), 1050 m., by a stream, fls. carmine red, 18.7.32, 2666 ; Arl Gird Dagh, 1800 m., by a stream, fls. bright carmine, 21.7.32, 2812 ; Rowanduz Gorge, 540 m., by a stream, 17.7.32, 2993 ; Penjwin (nr. Sulaimaniya), in the mountains, 26.6.32, *Khalil Feddo* 3443.

Punica granatum *L.*
Rustam Garden, Apr. 30, 240.

Onagraceae

Epilobium frigidum *Haussk.*
Arl Gird Dagh, 2700 m., among rocks by a stream, 24.7.32, 2961.

E. hirsutum *L.* var. **tomentosum** (*Vent.*) *Boiss.* Fl. Or. **2,** 746 (1872).
Nr. Zawita, 900 m., growing in a hedge, 10.10.31, 1663 ; Walash (on Chia-i-Mandali), 1050 m., by a stream, brilliant carmine fls., 18.7.32, 2667.

E. parviflorum *Schreb.*
Arl Gird Dagh, 2100 m., by a stream, pink fls., 21.7.32, 2847.

E. aff. **warakense** *Náb.* ?
Arl Gird Dagh, 1800 m., under rocks by a stream, fl. pale pinkish mauve, 21.7.32, 2814.
There is no material of *E. warakense* in Herb. Kew for comparison.

Cucurbitaceae

Bryonia multiflora *Boiss. et Heldr.*
Zawita Gorge, 900 m., growing over bushes on high slopes above the gorge, 23.4.32, 2207 ; Dohuk Gorge, 450 m., climbing over *Celtis tournefortii* L. on a ledge on a limestone cliff, 25.7.33, 3706.

Citrullus colocynthis (*L.*) *Schrad.*
Kut, along the river's edge, native name handhal, 17.9.32, *Yussef Lazar* 3496.

Cucumis callosus (*Rottl.*) *Cogn.* (*C. trigonus* Roxb.).
Hussainiya (Kut), in ploughed field, native name batush-al-'arab. 16.9.32, *Yussef Lazar* 3491.

Momordica charantia *L.*
Hinaidi, Baghdad, Oct. 29, *Jackson* 325.

FICOIDEAE

Aizoon hispanicum *L.*
Shargut (on the Zigurat mound), Mar. 30, 402 ; Chuwaiba Wells, nr. Zubair, on sandy soil, in a slight depression, 8.4.33, *Guest, Eig and Zohary* 5045 ; Southern desert (between Zubair and Jaliba), on sandy soil in a depression, *do.* 5056.

Glinus lotoides *L.*
Kut, Sept. 29, 207 ; Seleucia, Oct. 29, 272 ; Amara marshes (on banks of Majar canal), native name na'imah, 13.12.31, 1629 ; Rustam by Diyala River, along the river banks near high level, 24.9.32, 3510 ; Na'maniya, on the river bank, 29.10.32, 3586.

Mesembryanthemum nodiflorum *L.*
Basra, native name bol-udh-dhib, 3.4.21, *Dowson* 1555.

UMBELLIFERAE

Actinolema eryngioides *Fenzl.*
Arbil Province, grazed by animals, native name hassach, Apr.–May 33, *Mhd. al. Radhi* 3851.

Ainsworthia trachycarpa *Boiss.*
Acra, N. of Mosul, c. 450–900 m., fodder plant, native name karàfsūk (K.), Apr. 32, *Qaimaqam of Acra* 3097.
Two of the plants under this number are *f. integrifolia* Bornm.

Ammi majus *L.*
Rustam, May 30, 759A ; do., in fields, orchards, etc., white fls., native name zand-al-'arūs, 16.5.31, *Yussef Lazar* 1164 ; Daltawa, in fields and gardens, native name garair, 29.4.32, 26.4.32, *Guest and Darwish Hadari* 2230 ; Bada (N. of Baghdad), on sandy loam in a vegetable garden, 26.5.32, 2508 ; Shaadi (Kut), in a field of sesame, 6.10.32, 3577.

Ammi visnaga (*L.*) *Lam.*
Daltawa, common in cornfields (stubble), when dry the heads are used for making toothpicks, the seeds are also boiled and the decoction given to children to drink when they have foul breath, native name khaizaran, 26.5.32, 2433 ; Mosul-Ain Sifni, 360 m., fields, native name dairam (Mosul Town), 4033.

Anethum graveolens *L.*

Bada (N. of Baghdad), cultivated on sandy loam, dried leaves are sold in Baghdad as sbint for cooking with rice, native name karauyah, 26.5.32, 2506 ; Zawita, Kurdistan, 900 m., in garden below the village, used as a condiment for flavouring, native name sibat (K.), 27.7.33, 3740.

Anisosciadium lanatum *Boiss.*

Southern Desert (between Zubair and Jaliba), in depression on compact sand soil, 8.4.33, *Guest, Eig and Zohary* 5058.

A. orientale *DC.*

Jabal Hamrin, 29.3.30, 681 ; do., nr. Injana, 150 m., 6.4.31, 1428 ; Naft Khana, 150 m., on stony hillside, 29.3.32, 1858 ; Ain Sifni (Mosul Liwa), on hilly ground, fodder plant, native name kia'ai buhun na khush (K.), 10.6.32, *Salim Effendi* 2566 ; Jazira Desert, 20.4.33, *Edmonds* 3821.

Artedia squamata *L.*

Diana (nr. Rowanduz), Kurdistan, 600 m., fls. white and stylopod blue, 10.5.33, *Cuckney* 3834.

Bupleurum kurdicum *Boiss.*

Zawita, 1200 m., on rocky plateau, 28.7.33, 4579.

This plant does not quite agree with any of the forms given by Wolff (Pflanzenreich **4,** 228, p. 88). It is nearest to f. *bornmuelleri* Wolff, which has 4–6 radiate umbels, while no. 4579 has 2–5 radii.

B. brevicaule *Schlecht.*

Mahad (nr. Shaikhan), native name kia birnik (K.), 24.6.32, *Salim Effendi* 2614.

B. falcatum *L.* ssp. **exaltatum** (*M.B.*) *Briq.* var. **linearifolium** (*DC.*) *Boiss.* see Wolff in Pflanzenr. **4,** 228, p. 135 (1910).

Chia-i-Mandali (nr. Walza), 1950–2100 m., among rocks, 18.7.32, 2706.

B. subovatum *Link.* (*B. protractum* Link. et Hoffm.) var. **heterophyllum** (*Link.*) *Boiss.*

Daltawa, in an onion field, eaten by sheep, etc., 26.5.32, 2472 ; Balad Sinjar, 402 m., on roadside grazing strip, 28.4.33, 4118.

Carum caroides (*Boiss.*) *Bornm.*

Marmarut Mts. (nr. Rowanduz), 900–1200 m., on the stony mountainside, 19.4.32, 2084.

C. caucasicum *Boiss.*

Arl Gird Dagh, 3000–3300 m., on wet grassy slopes, 22.7.32, 2857.

C. cornigerum *Boiss. et Hausskn.*

Rowanduz Gorge, c. 600 m., 18.4.32, 2041.

C. elegans *Fenzl.*

Daltawa, in cultivated fields, native name joz bawa, 6.4.31, 1437 ; Qizil Robat, in a cornfield, the tuber is dug up and eaten by the people, 15.4.32, 1961 ; Tanjero Valley (Sulimaniya), on " daim " (unirrigated cultivated) land throughout the province, spring plant eaten by all

animals, later forms a tuber like the ground artichoke eaten by the people, 15.4.32, *Gowan* 2397 ; Tal Kaif, c. 300–600 m., useful for sheep grazing, native name ughrairah, Apr.–May 32, 3213 ; Arbil Province, grazed by stock, native name lizzaij, Apr. May 33, *Mhd. al Radhi* 3852.

Caucalis leptophylla *L.*

Mosul (Nabbi Yunis), 270 m., in cultivated field on the mound of Mosul, 2.4.31, 1344A ; Rowanduz Gorge, 600 m., 18.4.32, 2117 ; Zakho Valley, 600 m., in grassy patches among scrub oak trees, 25.4.32, 2253 ; Dohuk, native name svir hor (K.), 25.5.32, *Makki Beg* 3247 ; Kani Dolman hills, Kirkuk, 390 m., on dry stony rounded hill top, 30.4.33, 4213, 4314 ; Zawita, 1065 m., in pine forest on limestone crags, 30.7.33, 4763.

No. 4763 is too poor a specimen to be certain of the determination.

C. stocksiana *Boiss.*

Baghdad, in an orchard at Karada in a ditch, 13.4.32, 1951 ; Qizil Robat, in a hollow by a cornfield, dry stony soil but shady situation, 15.4.32, 1962 ; Baghdad, fields at Rustam, native name lizzaij, 30.4.33, *Yussef Lazar* 3895 ; Makhlat, 165 m., among rocks under a small cliff, 29.4.33, 4281.

C. tenella *Del.*

Mosul, 270 m., in fields at Nineveh, 2.4.31, 1344.

Cuminum cyminum *L.*

Bada (N. of Baghdad), cultivated on sandy loam, native name kammun, 26.5.32, 2502.

Daucus carota *L.*

Hussainiya (Kut), in gardens, native name jizar, 16.9.32, *Yussef Lazar* 3489 ; Zawita, 900 m., waste land in gardens, 27.7.33, 3752.

Daucus sp.

Baitnar nr. Ain Sifni (Mosul), poisonous to sheep, native name 'uzairah, 14.6.32, *Salim Effendi* 2580 ; Ba'adhara (nr. Shaikhan), fodder plant, native name kia'ai fallah (K.), on high land, 19.6.32, *Salim Effendi* 2598.

Material too imperfect for accurate determination.

Ducrosia anethifolia (*DC.*) *Boiss.*

Makatu nr. Mandali, May 30, 869 ; Baba Gurgur, nr. Kirkuk, 300 m., alluvial knoll on sandstone bluff, 8.7.33, 4012 ; nr. Altun Kopri on Zab River, Bakhtiari conglomerate hills, 8.7.33, 4027A.

Eryngium billardieri *Laroche* subsp. **nigromontanum** (*Boiss.* et Buhse) Wolff in Pflanzenr. **4,** 228, 150 (1913) (var. *meiocephalum* Boiss.).

Ser Amadia, 1770 m., on mountain slope, 3.8.33, 4977.

E. creticum *Lam.*

Mandali, 10.5.30, 890 ; Daltawa, along channels in old cornfields, native name zabaib-ar-rumi (or kassub), 26.5.32, 2466 ; Atrush, 900 m., stony hillside, 13.7.33, 3645.

E. glomeratum *Lam.*

Nr. Zawita, N. of Mosul, 900 m., 10.10.31, 1657A ; nr. Kirkuk, 420 m., on bare denuded earth hills, 13.4.33, *Guest, Eig and Zohary* 5096.

E. noëanum *Boiss.* ?

Ain Ghazal, 360 m., in a field, 28.4.33, 4084.

This plant shows only the foliage rosette.

Falcaria sioides (*Wib.*) *Aschers.* (*F. rivini* Host.).

Zawita, 900 m., in gardens, 27.7.33, 3749 ; Arbil Province, native name asyagh, grazed by animals, *Mhd. al Rahdi* 3871.

Ferulago angulata (*Schlecht.*) *Boiss.*

Zawita Gorge, Kurdistan, 840 m., on rocky slopes, giant herb 4–5 ft. high, 26.7.33, 3711 ; Zawita, 1065 m., in pine forest on limestone crags, 30.7.33, 4755 ; do., 990 m., in a small rocky ravine, 30.7.33, 4789 ; do., 825 m., 30.7.33, 4815.

The leaves in 3711 are very slightly scabrid or glabrescent, not markedly scabrid as in Kotschy's specimens. The remainder of Guest's plants show no leaves.

F. macrocarpa (*Fenzl*) *Boiss.* ?

Kani Dolman hills, Kirkuk, 390 m., dry stony rounded hilltop, 30.4.33, 4287.

Too young for more accurate determination.

F. aff. **stellata** *Boiss.*

Rowanduz Gorge, 450 m., 20.4.32, 2145 ; Marmarut Mt. (nr. Rowanduz), 1200 m., 10.5.33, *Cuckney* 3829.

This plant shows no mature fruit. It is very near to *F. stellata* Boiss or *F. longistylis* Boiss., but differs from them in the narrower and more acuminate involucral and involucellar bracts.

Foeniculum vulgare (*L.*) *Mill.*

Basra, Oct. 29, 309 ; Rustam, cultivated from seed obtained from Mosul, 19.9.31, *Yussef Lazar* 1371 ; do., native name ghaznaij, 4.6.32, 3420.

Grammosciadium macrodon *Boiss.* var. **cornutum** Náb. in Publ. Fac. Sci. Univ. Masaryk **35,** 124 (1923).

Nr. Amadia, native name kammun (K.), 1932, *Majid Mustafa* 3606.

Lagoecia cuminoides *L.*

Ain Sifni (Mosul Liwa), 450 m., fallow land, good fodder plant, native name kia'ai ghazalah (K.), 9.6.32, *Salim Effendi* 2562 ; Acra, c. 450–900 m. ?, fodder plant, native name nafal spi (K.), mid-Apr. 32, *Qaimaqam of Acra* 3083 ; Dohuk, native name gia gumînk (K.), 8.6.32, *Makki Beg* 3286.

Lisaea strigosa (*Banks et Sol.*) *Eig* (*L. syriaca* Boiss.) ?

Baitnar (nr. Ain Sifni), 375 m., not of much feeding value, native name lizaij, 14.6.32, *Salim Effendi* 2579.

This specimen shows only immature fruits and fls. and lacks lower leaves.

Oliveria decumbens *Vent.* (*O. orientalis* DC.).

Arbil Province, grazed by livestock, native name alaich-al-ghazal, Apr. 33, *Mhd. al Radhi* 3842 ; Kirkuk Prov., useful grazing pl. native

name nuînúah, 14.5.33, *Ali Effendi Hadari* 3937 ; Ghurfa Plain (N. of Daltawa), 150–450 m., very common on margins of depressions on dry grassy steppe, also in fields, etc., throughout Mosul plain, 7.7.33, 4001.

Malabaila aucheri *Boiss.*

Tuz, in cultivated fields, 210 m., 4.4.31, 1401 ; Qosh Tapa, nr. Arbil, 405 m., native name gaizagiya, 2.4.31, 1483 ; Mandali, conspicuous by its orange fls. in fields of ripening corn, native name kizar, 26.3.32, 1728 ; Qizil Robat, in a cornfield, 15.4.32, 2640.

The fruits of *M. aucheri* vary considerably, from 7–11 mm., in length, from glabrescent to pubescent on the outer face and from obovate-orbicular to elliptical. As there is little or no correlation between these characters, and as intermediates between the extremes occur, this material is regarded as belonging to one polymorphic species.

Distr. Persia, 'Iraq.

M. aucheri *Boiss.* ?

Mosul, in a wheat field, native name dolab-al-hawa, 10.4.32, *Yussef Lazar* 3354.

No fruit, but almost certainly this species.

Pimpinella barbata (*DC.*) *Boiss.*

Mandali, 9.5.30, 793.

P. corymbosa *Boiss.*

Qara Tepe, 405 m., on the edge of a cornfield, 15.4.32, 1956.

P. kotschyana *Boiss.*

Atrush, 895 m., on red marl, 13.7.33, 3631 ; Zawita, 840 m., 25.7.33, 3689 ; do., 1080 m., in pine forest on steep stony slope, 28.7.33, 4633 ; do., 1230 m., on the mountainside, 30.7.33, 4868.

P. kotschyana *Boiss.* ?

Baqasra (nr. Ain Sifni), 375 m., fodder plant, native name zahjafil (K.), 15.6.32, *Salim Effendi* 2586.

A poor specimen showing only an immature inflorescence and the root.

P. puberula (*DC.*) *Boiss.*

Rowanduz Gorge, 600 m., 12.10.31, 487 ; do., on sandy soil by a stream, 25.7.32, 2990.

No. 487 shows only flower buds and its determination is doubtful.

Pimpinella sintensii *Wolff* var. **cinerea** *Blakelock* var. nov. Tota planta cinereo-pubescens. Petala extra pubescentia.

Amadia, Kurdistan, c. 1500 m., on rocks in Mazurka Gorge, 2.8.33, 3783.

Distr. (of species), Asia Minor (Kurdistan).
(of var.), N. 'Iraq.

P. tragium *Vill.*

Chia-i-Mandali, 2700 m., on top of the ridge on stony soil amongst rocks, 19.7.32, 2709, 2709A ; do., 2400 m., on the rocky mountainside, 19.7.32, 2801 ; Jabal E.N.E. of Seri Hassan Beg, 1950 m., on the stony mountainside, 24.7.33, 2923 ; Arl Gird Dagh, 3600 m., on rocks, 21.7.32, 3057.

Pimpinella sp.

Rowanduz Gorge, 600 m., on the stony hillside, 25.7.32, 3219 ; Balad Sinjar–Tal Afar, 330 m., on semi-natural steppe, 28.4.33, 4176.

These plants lack mature fls. or fruits.

Prangos ferulacea (*L.*) *Lindl.* var. **carinata** (*Griseb.*) *Fiori* Nuova Fl. Anal. Ital. **2,** 98 (1925).

Amadia, 1170 m., in a garden in the village, eaten by animals (cultivated, but said to grow wild in the locality), native name haliz, 27.3.31, 1256 ; Jabals Daimka and Kashan (nr. Gilli) Zakho, found especially in the hills, but sometimes cultivated for seed or winter fodder, an important fodder plant especially for sheep, larger animals also eat it after it has been dried, native name halis (K.), 11.5.32, *Mudir of Gilli* 3147.

Both specimens have long, very fine leaf-segments (under 0·5 mm. wide). The fruit of no. 3147 is small (12–15·5 mm. long). Since these two characters vary considerably in the European material of var. *carinata* examined, no subvarietal name has been given (cf. Sandwith in Bot. Mag. 9643).

Distr. (of var.) Italy (Apulia), Rumania (the Iron Gates).
(of sp.) Italy, Sicily, Balkan Penins., As. Minor, Cauc., Pers.

Also recorded by Pampanini from Cyrenaica (Rend. Sem. Fac. Sci. Univ. Cagliari **8,** 2, 21 (1938)).

P. haussknechtii *Boiss.*

Chia-i-Mandali, 2100 m., on the mountainside, giant fennel 3 ft. high, 18.7.32, 2693.

P. pumila *Boiss.*

Nr. Kirkuk, 420 m., on bare denuded earth hills, 13.4.33, *Guest, Eig and Zohary* 5098.

P. uloptera *DC.*

Chia-i-Mandali, 1950 m., on the mountainside, 18.7.32, 2694.

Prangos sp.

Marmarut Mts. (nr. Rowanduz), 1200 m., on a rocky plateau, 19.4.32, 2065.

Material too young to be certain of the determination.

Scandix pecten-veneris *L.*

Baghdad, in date gardens at Karada, native name minqar-al-laqlaq, 15.3.31, 22.3.31, 1118, 1118A ; Amadia, 1050 m., in fields in the valley, native name kaizhanūk, 27.3.31, 1254 ; Mandali, in a cornfield, native name halq-al-laqlaq, nunqar-al-laqlaq (= " storks beak or bill ") or sölaqah (K.), 26.3.32, 1802 ; Rowanduz Gorge, 450 m., on a grassy slope under a cliff, 17.4.32, 2028.

S. pecten-veneris *L.* var. **breviorostris** Boiss. Fl. Or. **2,** 915 (1872).

Mosul, on the hill, native name munkar-al-laqlaq, 23.4.32, *Yussef Lazar* 3330 ; do., in a wheat field, native name minkar-al-laklak, 12.4.32, 3331.

S. stellata *Banks et Sol* (*S. pinnatifida* Vent, *Scandicium stellatum* (Sol.) Thellung).

Rowanduz, 26.3.30, 587 ; Jindian, nr. Rowanduz, 25.3.30, 745 ; Rowanduz Gorge, 450–600 m., damp situation on a grassy slope, 17.4.32, 2029 ; do., 750 m., grassy slope by a water fall, 18.4.32, 2118.

In Thellung's account of this species these specimens are var. B. *genuinum* (Ledeb.) Thellung, var. II *vulgare* Thell., var. I. *pinnatifidum* (Vent.) Thell. (Fedde, Repert. Sp. Nov. **16,** 17–18 (1920)).

Sium lancifolium *MB.*

Rowanduz Gorge (Kurdistan), 750 m., 12.10.31, 452.

Smyrniopsis cachroides *Boiss.*

Arbil, in cornfields on red loam, 375 m., 21.4.32, 2170 ; nr. Dohuk, 450 m., 25.4.32, 2233 ; Ain Sifni (Mosul Liwa), 450 m., native name hafjar kalishat (K.), 9.6.32, *Salim Effendi* 2557.

Tordylium aegyptiacum (*L.*) *Lam.*

Khanzad Valley (nr. Arbil), 420 m., 17.4.32, 2148 ; Tal Kaif, c. 300 m., widely distributed on the plains, native name karkaimah, useful for sheep grazing, Apr.–May 32, *Mudir of Tal Kaif* 3177 ; Dohuk, native name khurîlk, 8.6.32, *Makki Beg* 3293 ; Mosul, in a wheat field, Apr. 32, *Yussef Lazar* 3408 ; Ain Ghazal (Mosul Province), 360 m., in a field, 28.4.33, 4072.

Torilis neglecta *Roem. et Schult.*

Daltawa, in gardens under shade of trees in ditches, etc., native name garair, lizaij or zand-al-arus, 26.5.32, 2458 ; Rustam, 12.7.32, *Yussef Lazar* 3414.

Trachydium depressum *Boiss.*

Arl Gird Dagh, Kurdistan, 3600 m., on rocks, 21.7.33, 3057A.

Trigonosciadium viscidulum *Boiss. et Haussk.*

Zakho Pass, 750 m., 25.4.32, 2284.

Turgenia latifolia (*L*) *Hoffm.*

Baqasra, nr. Ain Sifni, 375 m., fodder plant, native name japan dirri (K.), 10.6.32, 2575 ; Tal Kaif, c. 300–600 m., useful for sheep grazing, native name luzzaij or qanjar, Apr.–May 32, *Mudir of Tal Kaif* 3199 ; Arbil Province, grazed by livestock, native name khummäsh, Apr.–May 33, *Mhd. al Rahdi* 3843 ; Balad Sinjar–Tal Afar, 330 m., on roadside strip of waste land, 28.4.33, 4126.

Zozimia absinthifolia (*Vent.*) *DC.*

Zawita Gorge, 900 m., on high rocky ledges above the gorge, 23.4.32, 2188.

Cornaceae

Cornus australis *C. A. M.*

Amadia, 1200 m., on a cliff above a millstream at Sulaf Gorge, 2.8.33, 3765.

CAPRIFOLIACEAE

Lonicera arborea *Boiss.* var. **persica** (*J. et S.*) *Rehder.* Syn. Lon. 133 (1903) (*L. nummulariaefolia* J. et S.).

Arl Gird Dagh (nr. Rust), 1800-2100 m., common on mountainside shrub 4–5 ft. high, 24.7.32, *Guest and Ludlow-Hewitt* 2925 ; Zawita, 1170 m. in oak forest on steep rocky slope, 28.7.33, 4586.

RUBIACEAE

Asperula arvensis *L.*

Zawita Gorge, 900 m., on a grassy slope, 23.4.32, 2185 ; Suwara-Tukka, 1050 m., on a grassy slope on the mountainside, 23.4.32, 2219.

A. asterocephala *Bornm.*

Zawita Gorge, 840 m., rocky slopes, 26.7.33, 3725 ; do., 780 m., on limestone rocks, 26.7.33, 4474.

A. asterocephala *Bornm.* f. **velutina** *Bornm.* in Bull. Herb. Boiss. **7,** 116 (1899).

Dohuk Gorge, 450 m., on a cliff of limestone, 25.7.33, 3708.

This plant differs slightly from Bornmuller's type of f. *velutina* in having elliptical-oblong, rather than ovate, leaves and a longer and denser indumentum.

A. glomerata (*MB.*) *Griseb.*

Atrush, Kurdistan, 885 m., on red marl banks in open pine forest, 13.7.33, 4394 ; Zawita Valley, 825 m., on red marl banks, 25.7.33, 4437 ; Zawita, 870 m., do., 1.8.33, 4885.

A. humifusa *Bess.*

Jadida (N. of Baghdad), in a thicket of tamarisk, etc., by the River Tigris, fl. white, 26.4.32, 2491 ; Seri Hassan Beg, 1800 m., on the stony hillside, 24.7.32, 3035.

A. prostrata (*Adams*) *C. Koch.*

Chia-i-Mandali (Rowanduz Area), 2400 m., on the stony mountainside, 20.7.32, 2790.

A. prostrata (*Adams*) *C. Koch* var. **brachystegia** (*Boiss.*) *Blakelock* comb. nov. (A. *aspera* (MB.) Boiss. var. *brachystegia* Boiss. Fl. Or. **3,** 28 (1875)).

Arl Gird Dagh, 3600 m., among rocks, 22.7.32, 2878.

Callipeltis aperta *Boiss. et Buhse.*

Balad Sinjar–Tal Afar, 330 m., on semi-natural steppe, 28.4.33, 4172.

C. cucullaria (*L.*) *DC.*

Zakho Pass, 750 m., 25.4.32, 2286 ; Baqasra (nr. Ain Sifni), native name darmani kask (K.), 15.6.32, *Salim Effendi* 2588 ; Arbil Province, native name 'ushb kamal, grazed by livestock, May 33, *Mhd. al Rahdi* 3608 ; do., native name kafshat-al-'ajūz, Apr.–May 33, 3847 ; Zawita, 1065 m., in pine forest on limestone crags, 30.7.33, 4762.

C. microstegia *Boiss.*

Arbil, July 33, cultivated Hort. Bot. Reg. Kew, May 34, 3847A ; Baba Gurgur (nr. Kirkuk), 315 m., on soft sandstone rock, 16.4.33, *Guest, Eig and Zohary* 5104.

Galium adhaerens *Boiss. et Bal.*

Rowanduz Gorge, 600 m., 18.4.32, 2113.

G. aparine *L.*

Makhlat, 165 m., among rocks under a small cliff, 29.4.33, 4280.

G. aparine L ?

Baghdad (Karada), in shady places in date gardens, round trees, etc., Mar. 31, 1113 ; Amadia, 1020 m., in cool, shady places round trunks of trees, under walls, etc., in valley, native name kurkur, 27.3.31, 1250.

These plants show no fruit, and it is doubtful whether they are this sp. or *G. spurium* L. var. *vaillantii* (DC.) Gr. et Godr.

G. articulatum *(L.) Roem. et Schult.*

Diana Plain (nr. Rowanduz), 600 m., in a field on the open plain, very sweet smelling, 20.4.32, 2138.

G. coronatum *S. et S.* var. **stenophyllum** Boiss. Fl. Or. **3,** 80 (1875).

Marmarut Mt. (nr. Rowanduz), 900–1200 m., on the stony mountainside, 19.4.32, 2151 ; Zawita Gorge, 900 m., on the rocky mountainside, 23.4.32, 2184.

G. decaisnei *Boiss.*

Khanaqin, 210 m., on stony hillside, 29.3.32, 1837 ; Balad Sinjar–Tal Afar, 330 m., on semi-natural steppe, 28.4.33, 4168.

G. kurdicum *Boiss. et Hoh.*

Rowanduz Gorge, 750 m., on rocks by a waterfall, 18.4.32, 2115 ; Zawita, 1200 m., on shady limestone cliff, 28.7.33, 4620.

These two numbers are the wide-leaved form agreeing with Kotschy's specimen from Gara (no. 306B on label in Herb. Kew, probably a slip of the pen for 506B) and one of Haussknecht's specimens from Avroman and Schahu.

G. kurdicum *Boiss. et Hoh.*

Chia-i-Mandali, 2700 m., on rocky mountainside, leaves duller in colour and apparently distinct from 2725, 19.7.32, 2725A ; Arl Gird Dagh, 2700 m., among rocks, 24.7.32, 2967 ; do., 3300 m., 21.7.32, 3076 ; Chia-i-Mandali, 2400 m., on the stony mountainside, 20.7.32, 2788.

The narrow-leaved form, resembling Aucher-Eloy 737.

Chia-i-Mandali, 2700 m., on the rocky mountainside, 19.7.32, 2725.

No. 2725 is a narrow-leaved glabrous form approaching very close to *G. hyrcanicum* C. A. M. Bornmüller includes *G. kurdicum* Boiss. et Hoh. and *G. leiophyllum* Boiss. as varieties of one polymorphic species, *G. subvelutinum* (DC.) Stapf (in Beih. Bot. Centralbl. **58,** 2, 293–294 (1938)). Possibly the allied species from N. Persia *G. hyranicum* C. A. M. and *G. delicatulum* Boiss. et Hoh. should also be included, if this view is correct. *Distr.* Kurdistan.

G. mite *Boiss. et Hoh.*

Chia-i-Mandali (nr. Walash), 1200 m., 18.7.32, 2651 ; Zawita, 840 m., 25.7.33, 3694 ; Amadia c. 1500 m., on rocks in Mazurka Gorge, 2.8.33, 3776 ; Zawita, 990 m., on rocky cliff near the village, 30.7.33, 4830.

G. murale *L.*

Kani Dolman hills, Kirkuk, 390 m., on dry stony rounded hilltop, 30.4.33, 4310.

G. nigricans *Boiss.*

Mahad (nr. Shaikhan), used as a fodder plant, native name kia narim, (K.), 23.6.31, *Salim Effendi* 2605.

G. setaceum *Lam.* var. **longepedicellatum** *Post* f. **lasiocarpum** *Bornm.* in Verh. Zool. Bot. Ges. Wien **48,** 596 (1898).

Kani Dolman hills, Kirkuk, 390 m., on dry stony rounded hill-top, 30.4.33, 4309.

This form has hispid fruits and pedicels as long as in *G. decaisnei* Boiss. Bornmüller states that the intermediate forms between the two species may be due to ecological factors, such as shading (in Beih. Bot. Centralbl. **58,** 2, 296 (1938)).

G. tricorne *Stokes.*

Dohuk, 450 m., in cultivated fields, on dry stony soil, 1.4.31, 1301 ; Baghdad, common in fields and orchards at Karada, 13.4.32, 1113A ; Daltawa, in a cornfield, native name lizaij, 25.3.32, 1708 ; Mandali, in a cornfield, native name lizaij or rumaiminah ? (K.), 26.3.32, 1803 ; Daltawa, grazed by sheep but not relished much, 29.3.32, *Darwish Hadari* 2492A ; Daltawa in an onion field, eaten by all animals, 26.5.32 2492; Mosul in a wheatfield, 14.4.32, *Yussef Lazar* 3321.

Rubia tenuiflora *D'Urv.* **stenophylla** (*Boiss.*) *Post* Fl. Syr., Pal. & Sin. ed. 2, 582 (1932) (*R. olivieri* A. Rich. var. *stenophylla* Boiss. Fl. Or. **3,** 18 (1875)).

Zawita Gorge, 900 m., on rocky ledges above the gorge, open shrub, 23.4.32, 2200 ; Shaikh Adi, 900 m., on the hillside, 14.7.33, 3674 ; Zawita, 1110 m., in oak forest on steep rocky slope, 28.7.33, 4611 ; do., 1170 m., 28.7.33, 4597 ; do., 870 m., 30.7.33, 4794 ; do., c. 900 m., on rocky slope, 30.7.33, 4807 ; do., 825 m., on rocky slope, 30.7.33, 4811 ; do., in oak forest, 1065 m., 1.8.33, 4941.

R. tinctorium *L.*

Zawita, Kurdistan. E. of Dohuk, 900 m., in ditches and hedges in gardens in the valley, root yields a red dye, native name rînas (K.), 27.6.32, 3763.

Sherardia arvensis *L.*

Rowanduz Gorge, 750 m., on a grassy slope in the spray of a waterfall, 18.4.32, 2055 ; Zakho Valley, 600 m., in grassy patches among scrub oak trees, flowers pale mauve, 25.4.32, 2252.

Wendlandia ligustroides (*Boiss. et Hoh.*) *Blakelock* comb. nov. (*W. kotschyi* Boiss. et Hoh.).

Nr. Zawita, 900 m., among rocks on the hillside, 10.10.31, 1659 ; Zawita Gorge, 900 m., on rocky ledges above the gorge, 23.4.32, 2195 ; Hinnis, nr. Ain Sifni, N. of Mosul, 450 m., on limestone cliffs, fls. white, very sweet smelling, 12.7.33, 3611 ; Shaikh Adi Gorge, 750 m., on limestone rocks, 14.7.33, 3675 ; Zawita, 900 m., on limestone rocks, small shrub with sweet-scented flowers, 27.7.33, 3735 ; Amadia, c. 1500 m., on rocks in Mazurka Gorge, 2.8.33, 3779 ; Zawita, 1170 m., in clump of pines by an outcrop of flat limestone terraces, 28.7.33, 4555 ; Zawita, 1110 m., in oak forest on steep rocky slope, 28.7.33, 4609 ; do., on rocky limestone slope, 1125 m., 29.7.33, 4692.

There is a printed description attached to the type specimen in Herb. Kew, using the specific epithet *ligustroides*. This antedates the epithet *kotschyi*.

Valerianaceae

Valeriana alliariaefolia *Vahl.*
Arl Gird Dagh, 2100 m., by a stream, 21.7.32, 2924.

V. sisymbriifolia *Desf.*
Chia-i-Mandali, 2700 m., among rocks on the mountainside, fls. pinkish, 19.7.32, 2707 ; do., 2400 m., on a cliff, 19.7.32, 2797.

Valerianella chlorostephana *Boiss. et Bal.* (*V. boissieri* Krok).
Tanjero Valley (Sulaimaniya), on daim (unirrigated) land throughout the province, spring plant eaten by all animals, native name kunjara (?), 15.4.32, *Gowan* 2410.

V. coronata (*L.*) *Lam. et DC.* ?
Jabal Darawishka (nr. Khanaqin), 240 m., on stony hillside, 28.3.32, 1753 ; nr. Rowanduz, 900 m., on dry hills, 18.4.32, 2042.

The fruits of these two plants are too young to be determined with certainty.

V. kotschyi *Boiss.*
Khanzad Valley (nr. Arbil), 420 m., 17.4.32, 2007 ; nr. Dohuk, 450 m., in a cornfield, 25.4.32, 2232 ; Mar Jirjis (nr. Mosul), in a wheatfield, native name tüth-al-barri, 22.4.32, *Yussef Lazar* 3338 ; Mosul, on a hill, 11.4.32, 3382.

V. kotschyi *Boiss.* ?
Dohuk, 450 m., in cultivated fields on dry gravel soil, 1.4.31, 1317.

Fruit too young for accurate identification.

V. lasiocarpa (*Stev.*) *Betcke.*
Kirkuk, 210 m., in cultivated fields, 4.4.31, 1377 ; Makhlat, 180 m., on open *Stipa* steppe, 29.4.33, 4263 ; nr. Tauq, on flat hillock top, compact soil with few stones, 12.4.33, *Guest, Eig and Zohary* 5094.

V. leiocarpa (*C. Koch*) *O. Ktze.* var. **orientalis** (*DC.*) *O. Ktze.* in Act. Hort. Petrop. **10,** 195 (1887). (*V. dufresnia* Bge.).

Jabal Hamrin nr. Injana, 29.3.30, 684 ; Naft Khana, 150 m., on dry sandy hills, 29.3.32, 1843; Jabal Hamrin (nr. Table Mt.), 150 m., on dry sand hills, 30.3.32, 1908.

V. tridentata (*Stev.*) *Krok.*

Kirkuk, 210 m., in cultivated fields, 4.4.3, 1377B ; Arbil, 375 m., in cultivated fields, 4.4.31, 1452 ; Ain-al-Husan (nr. Sinjar), 315 m., on open *Poa* steppe, 28.4.33, 4236.

V. truncata (*Rchb.*) *Betcke.*

Kirkuk, 300 m., near a waterfall in a millstream, 16.4.32, 1993.

V. vesicaria (*L.*) *Moench.*

Kirkuk, 210 m., 4.4.31, 1377A ; Jabal Hamrin (nr. Table Mt.), on sandy soil, 28.3.32, 1832 ; Dohuk, 450 m., in a cornfield, 23.4.32, 2315 ; Acra, c. 450–900 m., fodder plant, native name topazūk (K.), mid.-Apr. 32, *Qaimaqam of Acra* 3087 ; Dohuk, 2.6.32, *Makki Beg* 3259 ; Mar Jirjis (nr. Mosul), in a wheatfield, native name tūth-al-barri (=land mulberry), 22.4.32, *Yussef Lazar* 3337 ; Kani Dolman hills, Kirkuk, 390 m., on dry stony rounded hilltop, 30.4.33, 4325 ; Baba Gurgur (nr. Kirkuk), 315 m., on light alluvial soil, 16.4.33, *Guest, Eig and Zohary* 5103.

Dipsacaceae

Cephalaria setosa *Boiss. et Hoh.*

Rowanduz Gorge, 600 m., on the stony hillside, 25.7.32, 2977 ; Hinnis, nr. Ain Sifni, N. of Mosul, 450 m., on limestone rocks, fls. white, 12.7.33, 3613 ; Amadia, Kurdistan, c. 1500 m., on rocks in Mazurka Gorge, 2.8.33, 3786 ; Zawita, 1170 m., in oak forest on steep rocky slope, 28.7.33, 4600.

Cephalaria syriaca (*L.*) *Schrad.*

Ba'adhara (nr. Shaikhan), on cultivated land, fodder plant, native name ziywan, 19.6.32, *Salim Effendi* 2595 ; Dohuk, on pasture and cultivated land, native name zîwan (K.), 25.5.32, *Makki Beg* 3246 ; Mar Jirjis (nr. Mosul), in a wheatfield, native name zîwan, 22.4.32, *Yussef Lazar* 3339 ; Zawita (nr. Dohuk), 840 m., 25.7.33, 3687.

Pterocephalus involucratus (*S. et S.*) *Spreng.*

Dohuk, native name gia bizhink (K.), 8.5.32, *Makki Beg* 3266.

P. kurdicus Vatke var. **viscosissimus** Bornm. (*P. nestorianus* Nábělek).

Amadia, Kurdistan, c. 150 m., on rocks in Mazurka Gorge, 2.8.33, 3778.

The capitula in our plant are no larger than in *P. putkianus* Boiss. et Kotschy (Avroman, 1867, *Haussknecht*). Since the type specimen (Chana Putkie, 24.9.1859, *Kotschy* 477) has no description printed on the label, *P. kurdicus* Vatke in Linnaea **38,** 734 (1874) is an earlier name than *P. putkianus* Boiss. et Kotschy in Fl. Or. **3,** 150 (1875), as Bornmüller points out in Beih. Bot. Centralbl. **58,** B, 301 (1938).

P. pyrethrifolius *Boiss. et Hoh.*

Ser Amadia, 1800 m., on top of the ridge, 3.8.33, 4983.

P. strictus *Boiss. et Hoh.*

Dohuk (Kurdistan), 450 m., on a cliff face, 10.10.31, 1586 ; Rowanduz Gorge, 600 m., on a rocky cliff, 25.7.32, 2986 ; Pirmum Dagh, 600–900 m., common on rocky hillside, 17.7.32, 3008 ; Seri Hassan Beg, 1800 m., 24.7.32, 3029 ; Hinnis, nr. Ain Sifni, N. of Mosul, 450 m., on limestone

cliff face, fls. pink, 12.7.33, 3612 ; Atrush (N. of Mosul), 795 m., on limestone cliffs, 12.7.33, 3624 ; Dohuk Gorge, 450 m., on a limestone gorge, 25.7.33, 3705 ; Zawita Gorge, 840 m., on rocks, 26.7.33, 3717 ; Shaikh Adi Gorge, 750 m., on limestone rocks, 14.7.33, 4410 ; Zawita range, 1050 m., rocky mountainside, 25.7.33, 4457 ; Zawita Gorge, 780 m., on limestone rocks, 26.7.33, 4467 ; Zawita, 1050 m., in pine forest on N. slope, 27.7.33, 4508 ; do., 930 m., on steep limestone crags, 27.7.33, 4519 ; do., 1170, among clump of pines by outcrop of flat limestone terraces, 28.7.33, 4560 ; do., 1110 m., on rocky slope, 29.7.33, 4672 ; do., 1125 m., on rocky limestone slope, 29.7.33, 4684 ; do., 1035 m., on steep limestone slope, 1.8.33, 4924 ; do., 1065 m., in oak forest, 1.8.33, 4946.

Scabiosa brachycarpa *Boiss.*

Atrush, 900 m., stony hillside, 13.7.33, 3641; Badi nr. Dohuk, 825 m., on open hillside, 25.7.33, 4426 ; Zawita, 1125 m., in oak forest on steep rocky slope, 28.7.33, 4542 ; do., 1200 m., on rocky plateau, 28.7.33, 4577 ; do., 1020 m., in pine forest, 30.7.33, 4829 ; do., 1230 m., in open oak forest, 30.7.33, 4851 ; do., 900 m., on old abandoned vineyard, 1.8.33, 4889.

S. divaricata *Jacq* (*S. sicula* L).

Kani Dolman hills, Kirkuk, 390 m., dry stony rounded hill top, 30.4.33, 4290B.

S. olivieri *Coult.*

Atrush, 795 m., common on mountainside, 12.7.33, 3621 ; do., 900 m., on stony hillside, 13.7.33, 3641A ; nr. Altun Kopri, c. 300 m., Bakhtiari conglomerate hills, 8.7.33, 4021 ; Kani Dolman hills, Kirkuk, 390 m., on dry stony barren hill top, 30.4.33, 4369.

S. palestina *L.* var. **calocephala** *Boiss.* Fl. Or. **3,** 114 (1875).

Mandali, 9.5.30, 921 ; Jabal Hamrin (nr. Table Mt.), 150 m., on sandy soil, 28.3 and 15.4.32, 1821 ; Arl Gird Dagh, 1800 m., on the stony hillside, 21.7.32, *Guest and Ludlow-Hewitt* 2810 ; Mar Jirjis (nr. Mosul), in a wheatfield, native name maira, 22.4.32, *Yussef Lazar* 3340 ; Kani Dolman hills, Kirkuk, 390 m., dry stony rounded hilltop, 30.4.33, 4290A.

S. palaestina *L.* var. **persica** *Boiss.* Fl. Or. **3,** 145 (1875).

Ba'adhara (nr. Shaikhan), on hilly ground, good fodder plant, native name kia killor (K.), 19.6.32, *Salim Effendi* 2594 ; Penjwin, in the mountains, 26.6.32, *Khalil Feddo* 3449 ; Zawita, 1230 m., in open oak forest, 30.7.33, 4852.

S. porphyroneura *Blakelock* sp. nov. (Sect. *Trochocephalus* Mutens et Koch (*Asterocephalus* Coult.)); a *S. aucheri* Boiss. aristis corona brevioribus vel subaequalibus et basi glabrescentibus vel sparse breviterque ciliatis, corona submajore.

Annua, 3·5–19 cm. alta. *Caules* ramosi, hirsuti. *Folia* linearilanceolata, indivisa vel in plantis majoribus ovalia in lobis linearilanceolatis 3–4 pinnatisecta, basi attenuata, utrinque hirsuta, margine integra, usque 6 cm. longa. *Pedunculi* 1–7 cm. longi. *Capitula* hemispheroidea (fructu spheroidea), 2–2·5 cm. diam. *Involucri folia* corollis longiora. *Corolla* vix radians, ochroleuca (in sicco), 8 mm. longa.

Involucelli tubus basi dense albo-pilosis, 4–4·5 mm. longus ; foveolis profundis 2 mm. longis. *Corona* 25–28-nervia, nervis atropurpureis, 6–8 mm. longa. *Aristae* corona breviores vel subaequales purpureae, longuiscule stipitatae (stipite 1·5–2 mm. longo), basi glabrescentes vel sparse breviterque ciliatae, 4·6 mm. longae.

Palestine. Jericho hill, 10 m., rocky ground, 24.3.1908, *J. E. Dinsmore* 4545.

Syria. Djebel el Kharbé, nr. Damascus, 3.5.1817, *Gaillardot* 1888 ; 50 km. north of Dayr-uz-Zawr, 275 m., plains, 17.4.1939, *J. E. Dinsmore* B4684.

'Iraq. Jazira Desert, Mar.–Apr. 1933, *C. J. Edmonds* 3803B (type). The specimens from Palestine and Syria are not in Guest's collection. Our sheet (Edmonds 3803) bears three specimens. One branch in flower, showing markedly radiant corollas, belongs to *S. palestina* L. (3803A). The other two specimens are entire plants in fruit (3803B). These were at first named *S. aucheri* Boiss, as were the other specimens here cited under *S. porphyroneura*.

On examination, however, it was seen that Boissier's descriptions of *S. aucheri* (Diagn. **1,** 2, 111 (1843) and Fl. Or. **3,** 145 (1875)) do not agree with the type number (Syria, *Aucher-Eloy* 771) in Herb. Kew and in Herb. Boiss., Geneva, although they agree fairly well with *Gaillardot* 1888. Gaillardot's specimen is quoted in Fl. Or. l.c. as *S. aucheri*.

A new description of *S. aucheri* Boiss., based on type material, is therefore given here.

S. aucheri *Boiss.* (Sect. *Trochocephalus*).

Annua, pumila, 5–10 cm., alta. *Caules* ramosi, hirsuti. *Folia* lineari-lanceolata, indivisa, basi attenuata, utrinque hirsuta, margine integra vel 1–2-dentata, c. 2·5 cm. longa. *Pedunculi* 3–10 mm. longi. *Capitula* hemispheroidea (fructu spheroidea), 1–1·5 cm. diam. *Involucri folia* corollis longiora. *Corolla* vix radians, 5 mm. longa. *Involucelli tubus* basi dense albo-pilosus, 2·5–5 mm. longus ; foveolis profundis 1·5–2·5 mm. longis. *Corona* 26–31-nervia, 2·5 mm. longa. *Aristae* corona longiores, breviter stipitatae (stipite 1 mm. longo), basi dense ciliatae, 3·5–5 mm. longae.

Syria. *Aucher-Eloy* 771, Herb. Kew et Herb. Boiss., Geneva (type). The nerves of the corona show no signs of being purple. The corollas are too faded to show the colour.

The specimens at Kew show less mature fruit and, therefore, somewhat smaller coronas (2–4 mm. long) than those from Geneva (coronas 2–5 mm. long).

This species differs from small plants of *S. rotata* M.B. in the shortly stipitate aristae with more densely ciliate bases. The corona is generally larger in *S. rotata*.

Post described the flowers of *S. aucheri* as flesh coloured (in Flor. Pal. Syr. and Sinai, ed. 2, **1,** 618 (1932)). His description " awns included " suggests that his plants are *S. porphyroneura*, which has yellow corollas in dried material.

The plants referred to as *S. aucheri* by Boulomoy in Flore du Liban et de la Syrie 167 (1930) and by Gombault in Bull. Soc. Bot. France **93,** 156 (1946) are, from the descriptions, probably *S. porphyroneura*.

BHIDEA STAPF ; A NEW GENUS OF INDIAN GRASSES

N. L. Bor.

Bhidea *Stapf.* Genus novum *Graminearum*, tribus *Andropogonearum*, nulla affinitate manifesta sed racemis duobus, spiculis infimis sterilibus homomorphis, gluma spiculae sessilis superiore 2-lobata e sinu aristata, ab aliis generibus facile distinguitur.

Spiculae in duos racemos dispositae ; paria spicularum duo vel tria infima utriusque racemi sterilia, ad glumas redacta ; pedicelli et articuli racemorum leviter clavati, altero margine dense barbati. *Anthoecia* spicularum sessilium duo, inter glumas inclusa ; inferum ad lemma redactum ; superum hermaphroditum. *Spicula sessilis* : gluma inferior dorso plana vel convexa, bicarinata, altero margine triente superiore late alata, altero margine dimidia parte superiore late alata, 2-nervis, marginibus inferne inflexis ; gluma superior valde compressa, 2-lobata, arista scabra angustissima alata praedita. *Anthoecium inferum* vacuum ; lemma lanceolatum, hyalinum ; palea nulla. *Anthoecium superum* * ; lemma oblongum, breviter bilobatum, e sinu arista geniculata scabra praeditum ; aristae columna brunnea, torta ; palea oblonga, brevis, hyalina ; antherae tres ; lodiculae duae. *Spicula pedicellata* sterilis ; gluma inferior ambitu lanceolata, altero margine late alata, mutica vel 2-lobata, lobis aristatis ; gluma superior conduplicata, glumae inferiori aequilonga vel ea longior, acuta, vel in aristam gracilem producta. *Spiculae infimae* steriles, homomorphae, spiculis pedicellatis similes.

Gramina annua ; culmi graciles, humiles ; foliorum laminae breves.

Bhidea burnsiana *Bor* ; species nova.

Gramen annum, 8–13 cm. altum. *Culmi* graciles, erecti, glabri laevesque, brunneo-purpurei, vaginis prorsus tecti, ad nodos omnes glabri vel ad nodos superiores pilis longis albis mollibus barbati. *Foliorum laminae* lineares, acutae, 2·5–4 cm. longae, 3–4 mm. latae, marginibus apicem versus sparse denticulati, basi marginibus pilis longis mollibus albis e tuberculis ciliatae ; *vaginae* laeves glabraeque, internodia complectentes, aliquatenus laxae, marginibus hyalinae ; vaginarum summarum laminae paene nullae, ligulae membranaceae, 1 mm. longae, cum marginibus vaginarum continuae.

Inflorescentia e racemis duobus e vagina summa exsertis sistens ; racemi demum divaricati, 1·5–2 cm. longi, pedicellati, 3–4-articulati ; spiculae sessiles, simul cum spiculis pedicellatis articulationibus insidentes. Spicularum paria duo infima sterilia, ceterarum spiculae sessiles hermaphroditae, pedicellatae steriles ; articuli et pedicelli leviter clavati, altero margine dense ciliati. *Spicula sessilis sterilis:* gluma inferior 4 mm. longa, chartacea, lanceolata, dimidia parte superiore late alata, apice mutica vel leviter bilobata ; gluma simul cum ala 6 mm. longa ; gluma superior nulla vel in squamam angustam membranaceam 4-5 mm. longam redacta. *Spicula pedicellata sterilis* : pedicellus 1·5 mm. longus, margine exteriore dense barbatus ; gluma inferior 5·5 mm. longa ; media pars chartacea, lanceolata, altero margine late alata, altero margine anguste alata, 1-nervis ; alae membranaceae ; nervus medius anguste alatus ;

* Hermaphroditum.

gluma superior in squamam angustam acutam 3-nervem glumae inferiori aequilongam vel ea longiorem redacta. *Spicula sessilis hermaphrodita* : gluma inferior 6·5 mm. longa, oblonga, 2-nervis, 2-carinata, apicem versus altero margine triente superiore late alata, altero margine dimidia parte superiore late alata, dorso plana vel leviter convexa, laevis glabraque, marginibus inferne inflexis ; gluma superior 4 mm. longa, hyalina, valde compressa, biloba, e sinu aristata ; arista 4·5 mm. longa, dimidia parte inferiore angustissime alata, scabra. *Anthoecium inferum* vacuum ; lemma squamiforme, hyalinum, 4 mm. longum ; palea nulla. *Anthoecium superum** ; lemma oblongum, 3 mm. longum, 1·5 mm. latum, marginibus hyalinum, chartaceum, dorso valde carinatum, 2-nerve, 2-lobatum, e sinu aristatum ; arista 1·8 cm. longa, geniculata, columna brunnea scabra valde torta 0·9 mm. longa ; antherae tres, 1·5 mm. longae ; styli duo, elongati ; stigmata duo, plumosa ; lodiculae duae, quadratae. *Spiculae pedicellatae* : pedicellus 3·5 mm. longus, clavatus, altero margine dense barbatus, apice obliquus ; gluma superior et inferior glumis spicularum sterilium similes.

Bombay. Lonavla, 1919, *R. K. Bhide* (typus in Herb. Kew.). Named in honour of Dr. W. Burns, C.I.E., I.A.S., as Mr. Bhide had intended.

This grass was first collected by R. K. Bhide, Economic Botanist, College of Agriculture, Poona, as long ago as the year 1919. The collector, thinking it to be a species of *Ischaemum*, named it in manuscript and sent it to the late Dr. Otto Stapf for opinion. Dr. Stapf was convinced that the specimen represented a new type of Andropogoneae and that it deserved to be treated as a new genus. He intended, as he informed Mr. Bhide, to call this new genus *Bhidea*, in honour of its collector. Subsequently Mr. Bhide wrote that Dr. Stapf's opinion had come too late and that he had read a paper on his new species before the Indian Science Congress, during its meeting at Nagpur in 1920. Dr. Stapf replied suggesting that the publication of the paper might be suppressed. Mr. Bhide evidently took Dr. Stapf's advice for in the published proceedings of the Indian Science Congress for that year, and succeeding years, there is no mention of any paper read by Mr. Bhide. There the correspondence ends, and there, also, ends any further attempt to proceed with the publication of a description of the new genus and species.

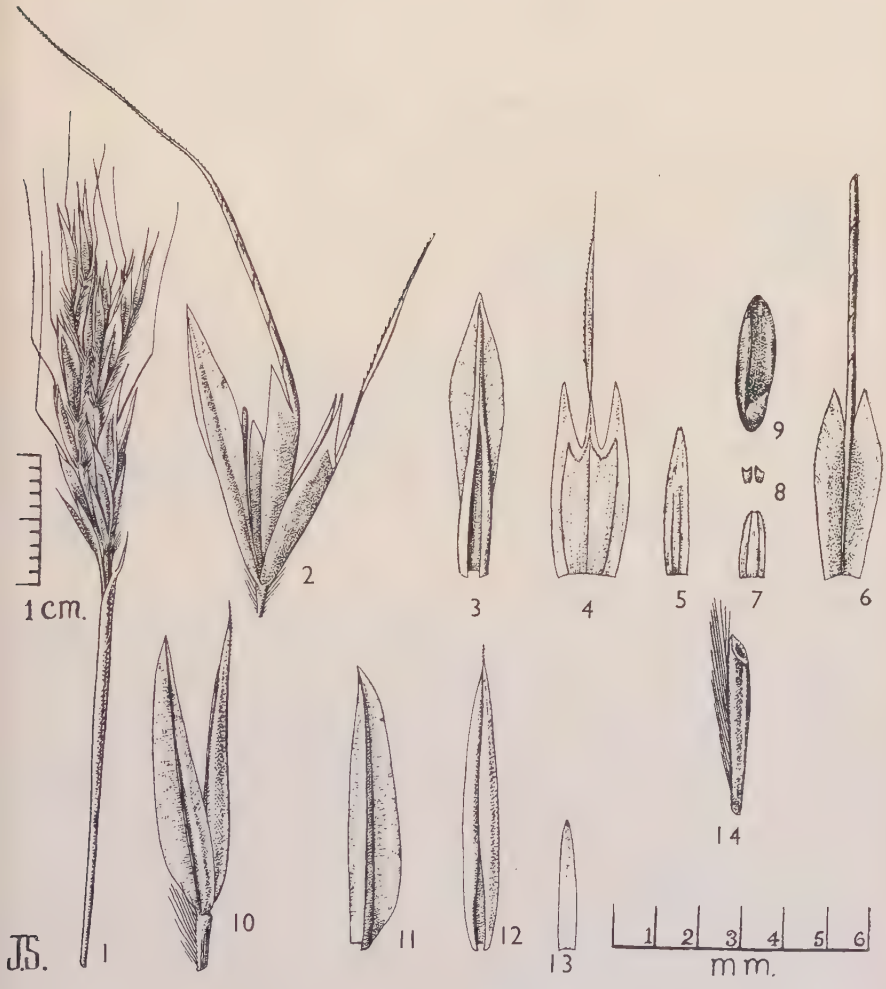
In 1935 Blatter and McCann published their account of the grasses of Bombay, and, strange to relate, this particular grass is not mentioned. This omission is all the more mysterious seeing that the illustrations for *The Bombay Grasses* were executed by the same Mr. Bhide who discovered this new genus. This remarkable grass seems to have been entirely forgotten by everybody who had anything to do with it.

As regards the systematic position of this grass it would appear to fall within the ambit of the subtribe *Andropogoninae* Stapf but does not fit into any of the genera in the subtribe. The two-lobed, awned upper glume of the fertile spikelet is very characteristic of this new genus, as are the sterile homomorphous spikelets at the base of the raceme and the two-lobed lemma of the upper floret.

Bhidea burnsiana is not the only species in this genus for, while the genus was being studied, another and quite distinct species came to light. In

* Hermaphroditum

October 1919, Mr. C. McCann collected several specimens of *Danthonidium Gammiei* (Bhide) C. E. Hubbard, between Jog and Siddarpur, Bombay, in open grassland. These specimens were sent to Kew and Mr. C. E. Hubbard found among them, accidentally gathered, another species of *Bhidea*. The species has spikelets and awns twice as large as those of *B. burnsiana* and three pairs of homomorphous spikelets at the base of the raceme ; moreover, both glumes of all spikelets are finely awned. The new species is not being described at this stage in the hope that further material may be forthcoming.



BHIDEA BURNSIANA BOR

1 Inflorescence.
2 Sessile spikelet.
3 Lower glume of sessile spikelet.
4 Upper glume of sessile spikelet.
5 Lower lemma of sessile spikelet.
6 Upper lemma of sessile spikelet.
7 Palea of upper lemma of ditto.
8 Lodicules.
9 Grain.
10 Pedicelled spikelet.
11 Lower glume of pedicelled spikelet.
12 Upper glume of pedicelled spikelet.
13 Lemma of pedicelled spikelet.
14 Joint of the raceme.

Vernalization and Photoperiodism.

The book* under the above title, published by the Chronica Botanica Company, is a symposium of papers by fifteen authors. The articles are of different lengths and are mostly summaries of recent researches. The history of vernalization is outlined by R. O. Whyte and that of photoperiodism by A. E. Murneek. The contribution by F. W. Went on "Thermoperiodicity" extends the contents beyond the title. Naturally, physiological experiments and theories proposed from a study of their results form the bulk of most of the contributions. It is impossible in a short notice to deal adequately with all the articles. Two may be noted as of special interest.

A. Lang deals with the genetical analysis of the short-day character in a variety of *Nicotiana tabacum*. He shows that the short-day character of *Maryland-Mammut* has a monofactorial basis and is recessive, but with incomplete dominance, to the day-neutral condition. A very useful "Nachtrag" to Lang's paper reviews what is known regarding the genetics of vernalization and photoperiodism.

H. A. Allard, one of the pioneers in the study of photoperiodism, has a most interesting and thought-stimulating paper on the "Length of day in the climates of past geological eras and its possible effects upon changes in plant life." He notes that so long as there is light, terrestrial rotation, inclination of the axis to the plane of the ecliptic, and revolution of the earth around the sun, cycles of length of day will operate on plant and animal life upon the earth. Length of day must always be a function of climate. Geologists agree that great changes of climate have taken place. It is likely that changes in the obliquity of the earth's axis have occurred and still occur very slowly. Such changes must result in changes in the length of day and influence zonation of climates over the earth's surface. It is suggested that the palaeontological evidence of a uniform climate over much or all of the earth in the Cretaceous Period indicates an obliquity of the earth's axis nearer to zero than it has at present (it has now a mean value of 23° 27′ 3″). Changes in the length of day must influence the distribution of Angiosperms and the composition of floras. The increasing diversity of floras with more and more marked latitudinal zonation which can be traced through Tertiary times can be assumed to be correlated with increasing obliquity of the earth's axis.—W. B. Turrill.

*Vernalization and Photoperiodism, a Symposium, by A. E. Murneek and R. O. Whyte, and others, pp. 196, published as Lotsya, vol. 1, 1948, Waltham, Mass. : the Chronica Botanica Co. ; London, W.C.2. Wm. Dawson and Sons, Ltd. Price $4.50.

TROPICAL AFRICAN PLANTS: XX*.

Cladostemon kirkii (*Oliv.*) *Pax et Gilg* [Capparidaceae] in Engl., Pflanzenw. Ostafr. **C,** 185 (1895) ; Gilg et Benedict in Engl., Bot. Jahrb. **53,** 183 (1915) ; Engl., Pflanzenw. Afr. **3** (**1**), 233, fig. 147 (1915) ; Pax et Hoffm. in Engl. et Prantl, Nat. Pflanzenfam. ed. 2, **17,** 171 (1936).

Euadenia? *kirkii* Oliv. in Oliv., Fl. Trop. Afr. **1,** 91 (1868).

Cladostemon paradoxus A. Br. et Vatke in Monatsb. Acad. Berl. 1876, 866 (1876) ; Pax in Engl. et Prantl, Nat. Pflanzenfam. **3**(**2**), 229 (1891).

Cladostemon paxianus Gilg in Engl., Pflanzenw. Ostafr. **C,** 185 (1895).

Ritchiea gigantocarpa Gilg et Benedict in Engl., Bot. Jahrb. **53,** 179 (1915); Pax et Hoffm. in Engl. et Prantl, Nat. Pflanzenfam. ed. 2, **17,** 169 (1936).

Kenya. Near Changamwe, 100 m., 14 Mar. 1902, *Kässner* 264. Near Mombasa, Feb. 1876, *Hildebrandt* 1993 (type of *C. paradoxum*). Without locality, May 1880, *Wakefield* s.n. (fl.) Vipingo Estate, in coastal scrub, 13 Km. N. of Mombasa, 29 Dec. 1945, *Bally* 4694 :—small tree to 3·5 m.; fruit woody.

Tanganyika. Namguru, in fringing forest, 18 June 1903, *Busse* 2955 (type no. of *R. gigantocarpa* in Amani Herb.). Mayanga, Lindi, May 1903, *Busse* 2535 (Amani Herb.). Mroweka near Lindi, 23 Nov. 1908, *Koerner* in Amani Herb. no. 2223. Mafia Island, rare in *Diospyros*, *Mimusops*, *Markhamia sansibarensis* evergreen forest on coral rock from Uranzi to Kikuni, 9 m., 13 Aug. 1937, *Greenway* 5089 :—a not much branched tree up to 9 m. high with slightly fissured greyish-brown bark, trifoliate leaves and large round brown fruits pendant on long gynophores.

Portuguese East Africa. Lupata, Oct. 1858, *Kirk* s.n. (flowers) :—small tree. Lupata, 1 Nov. 1858, *Kirk*, s.n. (sketch and analysis of flowers) (type of *E. kirkii*). Near Tette, Jan. 1859, *Kirk* 173 :—fruit of a small tree ; when open fruit smells like coal-tar. Madanda Forest, Nov. 1911, *Dawe* 480 :—shrub.

Nyasaland. Without locality or date, *Buchanan* 1049. Zomba, 900 m., 1901, *Sharp* 180 :—rare tree, 9–12 m. high.

There is an excellent illustration in the Kew Herbarium of the flowers drawn in the field by Kirk in 1858 from a specimen he collected at Lupata on the Zambezi. On the back of this illustration Kirk describes the fruit as " globular on a long stalk, the shell brittle and granular, the seeds uniform in a mass of pulp which dries giving off a strong disagreeable smell like coal tar. " Oliver (l.c.) obtained his description of the fruit from a Kirk specimen named *Crataeva* sp. in the Kew Museums which cannot now be traced ; the herbarium specimen and the accompanying fruit now in the Kew Herbarium were among the Kirk specimens which were mislaid in a dockyard store (Kew Bull. 1922, 59 : 1922) and were not received at Kew until 1883. The dried flowering specimens were

*Continued from Kew Bull., 1947, 35.

from Lupata and probably represent the material from which the drawing (which is the type of the specific name *Kirkii*) was made. The fruit came from Tette, also named *Crataeva* sp., and the smell of coal tar is again mentioned. It appears that Gilg, who examined the Kew specimens in 1914, never saw this excellent fruiting specimen. Had he done so, he would not have described a year later his *Ritchiea gigantocarpa*, based on fruiting specimens collected by Busse on the Tanganyika coast.

I am indebted to Mr. P. R. O. Bally for collecting fruit of this tree from near Mr. Makwalder's home at Vipingo north of Mombasa. At Mr. Bally's request, Mr. Makwalder forwarded flowers from the same tree some months later, and so the flowers and fruits have again been correlated after an interval of some 87 years.

The specific names *C. paradoxus* A. Br. et Vatke and *C. paxianus* Gilg have been relegated to the synonymy of *C. kirkii* by Gilg et Benedict (l.c.). *Ritchiea gigantocarpa* Gilg et Benedict is now added to the list, and the genus *Cladostemon* A. Br. et Vatke still remains monotypic.

My thanks are due to Mr. P. J. Greenway for sending material on loan from the Amani Herbarium, which material included a duplicate of the type specimen of *Ritchiea gigantocarpa*.

E. Milne-Redhead.

Bergia capensis *L.* [Elatinaceae], Mant. **1,** 241 (1771).

Bergia aquatica Roxb., Pl. Corom. **2,** 22 (1798), nom illegit.

Bergia verticillata Willd., Sp. Pl. **2,** 770 (1799), nom. illegit.

Elatine luxurians Del., Descr. Egypt, Hist. Nat. **2,** 216 (1813), nom. illegit.

Gold Coast. Shai, near Agomeda, in fetish pot in a bowl of water, June 1931, *Irvine* 1643A :—small erect herb up to 2 dm. high ; stems red ; flowers small, yellow, inconspicuous in the axils of the upper leaves.

Tanganyika. Mwanza, Davis 234 :—native name Kabula.

There is one record for this widely spread tropical plant in the Flora of Tropical Africa, that being from the Kordofan in the Anglo-Egyptian Sudan, but the specimen is not in the Kew Herbarium. The large collections received at Kew from Tropical Africa during the eighty years since the above record was published have added but two gatherings of *Bergia capensis* from such widely separated countries as the Gold Coast and Tanganyika.

Bergia capensis has three illegitinate synonyms. Linnaeus gave the species the epithet *capensis* in the belief that it came from the Cape. This was later proved wrong, and both Willdenow and Roxburgh independently changed the epithet to ones which they considered to be more applicable, namely *verticillata* and *aquatica* respectively. Delile rejected the epithet *verticillata*, as he did not consider that the flowers were strictly so arranged, and, not knowing of Roxburgh's epithet, proposed a further name, *luxurians*, for the species.

E. Milne-Redhead.

Polycarpon prostratum (*Forsk.*) *Asch. et Schweinf.* *[Caryophyllaceae] in Ost. Bot. Zeitschr. **39,** 128 (April 1889).

Pharnaceum depressum L., Mant. **2,** 562 (1771).

Alsine prostrata Forsk., Fl. Aegypt.-Arab. LXIV. 207 (1775).

Loeflingia indica Retz., Obs. **4**, 8 (1786), nom. illegit.

Polycarpaea memphitica Del. in Descr. Égypt, Hist. Nat. **2,** 211, t. 24, fig. 2 (1813).

Polycarpon apurense Kunth, Nov. Gen. et Sp. **6,** 40 (1823).

Arenaria ? prostrata (Forsk.) Ser. in DC., Prodr. **1,** 400 (1824), pro parte, excl. descr., quoad nom.

Polycarpaea ? depressa (L.) DC., Prodr. **3,** 375 (1828).

Arversia frankenioides Camb. in St.-Hil., Fl. Bras. Madrid **2,** 184, t. 112 (1829).

Hapalosia loeflingiae Wight et Arn., Prodr. Fl. Pen. Ind. Or. **1,** 358 (1834), nom. illegit.

Polycarpaea prostrata (Forsk.) Decne. in Ann. Sci. Nat. sér. 2, Bot. **3,** 263 (1835).

Polycarpon polyphyllum Blanco, Fl. Filip. 53 (1837).

Arversia loefflingiae [sic] [Wight et Arn.] Walp., Rep. **1,** 263 (1842), nom illegit.

Arversia memphitica (Del.) Webb, Fragm. Fl. Aethiop.-Aegypt. 40 (1854).

Arversia depressa (L.) Klotzsch in Peters, Mossamb. Bot. 140 (1861).

Polycarpon loeflingii [sic] [Wight et Arn.] Benth. in Benth. et Hook. f., Gen. Pl. **1**., 153 (1862), nom. illegit.

Robbairea prostrata (Forsk.) Boiss., Fl. Or. **1,** 735 (1867), pro parte, excl. descr., quoad nom.

Polycarpon depressum (L.) Rohrb. in Mart. Fl. Bras. **14**(**2**), 257 (1872), non Nutt. ex Torr. & Gray (1838).

Polycarpa prostrata (Forsk.) Kuntze, Rev. Gen. Pl. **1,** 51 (1891).

Polycarpa pusilla Hiern in Cat. Afr. Pl. Welw. **1,** 50 (1896), nom illegit.

Polycarpon indicum [Retz.] Merr. in Philipp. Journ. Sc. Bot. **10,** 302 (1915), nom illegit.

Polycarpon memphiticum (Del.) Broun et Massey, Fl. Sudan 71 (1929).

This variable plant, which is widely spread in the tropics of both the Old and the New World, has been known by a number of names. It is common in the Nile Valley, but not in the neighbouring deserts. The earliest specific epithet is that used by Linnaeus, namely *depressum*, which cannot be used under *Polycarpon* on account of Nuttall having applied the epithet independently to a Californian species of *Polycarpon*. Four years later *Alsine prostrata* Forsk. was published, based on a plant collected by Forskål near Cairo. In 1813 Delile described and figured the plant as

*Exell and Mendonça (in Carrisso, Consp. Fl. Angol. **1,** 110 : 1937) follow the Index Kewensis in attributing this combination to Pax (in Engl. et Prantl, Nat. Pflanzenfam. **3,** pt. 1B, 87 : 1889). Ascherson (l.c. 325) however points out that his combination was a few weeks earlier than that of Pax, which was not published in March 1889 as stated by Exell and Mendonça.

Polycarpaea memphitica, and at the same time figured (l.c. t. 24, fig. 4) a quite different plant under the erroneous name of *Alsine prostrata* Forsk. This mis-application by Delile of Forskål's epithet has caused great confusion, as can be seen by the above synonymy. Through the kindness of the Director of the Botanical Museum, Copenhagen, I have been able to examine the type specimen of *Alsine prostrata* Forsk. The specimen is in excellent condition and leaves no doubt that Forskål's epithet, *prostrata*, should be applied to the plant which was later described by Delile as *Polycarpaea memphitica*. As shown by Ascheron, l.c. 127, there is also strong circumstantial evidence in support of Forskål's poor diagnosis being referred to this plant, rather than to the plant to which Delile referred it. Its use for the plant on which Boissier founded his new genus *Robbairea* must, therefore, be discontinued, and consequently I propose a new name for this species†.

Robbairea delileana *Milne-Redhead*, sp. nov.

[*Alsine prostrata* (non Forsk.)—Del. in Descr. Egypt. Hist. Nat. **2,** 212, t. 24, fig. 4 (1813).]

[*Arenaria*? *prostrata* Ser. in DC., Prodr. **1,** 400 (1824), pro parte, quoad descr., excl. nom, et synon. Forsk.]

[*Polycarpaea prostrata* Decne. in Ann. Sci. Nat. sér. 2, Bot. **3,** 263 (1835), pro parte, quoad descr., excl. nom. et synon. Forsk.]

[*Robbairea prostrata* Boiss., Fl. Or. **1,** 735 (1867), pro parte, quoad descr., excl. nom. et synon. et spec. Forsk.]

Polycarpa robbairea Kuntze, Rev. Gen. Pl. **1,** 51 (1891).

This species, which is a plant of dry regions, is much more restricted in its distribution than *Polycarpon prostratum*, occurring from Egypt to Iraq in the north, and reaching Arabia and Somaliland in the south. It is well described and figured by Delile from a plant collected in sandy plains of Birket el-Hâggy, Egypt. Although I have not seen Delile's specimen, I consider that it should be taken as the type of the specific name *R. delileana*, for the description and illustration are entirely adequate, and are the earliest published record of the species. *Robbairea* Boiss. was founded as a monotypic genus, and its type is the species from which the generic characters were taken, i.e. *R. Delileana*, for which Boissier in error used the epithet *prostrata*.

In retaining *Robbairea* Boiss. as a genus distinct from *Polycarpaea* Lam. I am following Muschler, Post and Blatter. Apart from the technical character of the petal shape the general appearance is very different.

Philoxerus vermicularis (*L.*) *P. Beauv.* [Amaranthaceae], Fl. Owar, **2,** 65 (1818) ; Fawc. et Rendle, Fl. Jam. **3,** 141 (1914) ; Exell in Cat. Vasc. Pl. S. Tomé 273 (1944).

Gomphrena vermicularis L., Sp. Pl. ed. 1, 224 (1753).

Illecebrum vermiculatum L., Sp. Pl. ed. 2, 300 (1762), nom illegit.

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†Ascherson (l.c.), who realized the situation caused by Delile's misidentification, solves the problem by retaining the epithet *prostrata* for *Robbairea prostrata*, basing it on *Alsine prostrata* Del. non Forsk. This solution cannot be accepted, because *Alsine prostrata* Del. is a later homonym of *Alsine prostrata* Forsk.

Philoxerus vermiculatus [L.] Sm. in Rees., Cyclop. **27,** no. 3 (1814), nom illegit.

Iresine vermicularis (L.) Moq., in DC., Prodr. **13** (**2**), 340 (1849).

The earliest epithet for this plant is *vermicularis*, there being no justification for the alteration to *vermiculatum* that occurred in the second edition of Linnaeus' Species Plantarum. Baker and Clarke (Dyer, Flora of Tropical Africa **6**(**1**), 75 : 1909) follow Hiern (Cat. Afr. Pl. Welw. **1,** 897 : 1900) in adopting the illegitimate epithet *vermiculatus*, but attribute the combination with *Philoxerus* to Robert Brown (Prodr. Fl. Nov. Holl. 416 : 1810), who however merely indicated that *Gomphrena vermiculata* belonged to *Philoxerus* without actually making the combination. Hutchinson and Dalziel (Fl. W. Trop. Afr. **1,** 123 : 1927) follow Baker and Clarke whilst Schinz (Engl. et Prantl, Nat. Pflanzenfam. ed. 2, **16C,** 82 : 1924) adopts the correct name, but attributes the combination erroneously to Robert Brown.

E. Milne-Redhead

Geranium ocellatum *Camb.* var. **sublaeve** (*Oliv.*) *Milne-Redhead*, comb. nov. [Geraniaceae].

G. favosum Hochst. ex A. Rich., var. *sublaeve* Oliv. in Oliv., Fl. Trop. Afr. **1,** 292 (1868).

G. mascatense Boiss. var. *sublaeve* (Oliv.) Urb. in Jahrb. Kgl. Bot. Gart. **3,** 241 (1884).

G. ocellatum Camb. var. *camerunense* Knuth in Engl., Pflanzenr. IV, **129,** 63 (1912).

G. brevipes Hutch. et Dalz., Fl. W. Trop. Afr. **1,** 138 (1927).

I agree with Knuth in treating this plant from the Cameroons Mountain as a variety of *G. ocellatum* Camb. The relatively smooth surface of the fruiting carpels at once separates it from the Abyssinian *G. favosum* Hochst. ex A. Rich., whilst it differs from the East African variety of *G. ocellatum* Camb. in having more numerous hairs on the fruiting carpels in addition to the characters given by Knuth. Not having seen the type of Oliver's variety, Knuth left it under *G. favosum*, whilst he treated two German gatherings as a new variety, *camerunense* Knuth under *G. ocellatum*. Hutchinson and Dalziel, ignoring *G. ocellatum* Camb., treat the Cameroons Mountain plant as a new species allied to *G. favosum*, making Mann 1261 the type of the specific name *G. brevipes* Hutch. et Dalz., the same sheet also being the type of Oliver's varietal epithet.

British Cameroons. Cameroons Mt., 2100 m., Dec. 1861, *Mann* 1261 (type of *G. brevipes* and of *G. favosum* var. *sublaeve*) :—herbaceous plant 1.2 m. high. Cameroons Mt., Buea, just outside forest-land, 1830 m., Dec. 1929, *Maitland* 811. Cameroons Mt., in grassland, 2400 m., *Migeod* 209 : -climbing plant. Cameroons Mt., above Buea, 2800 m., 22 Dec. 1928, *Mildbraed* 10872.

Geranium yemense *Defl.* [Geraniaceae], Voy. Yemen 118 (1889) ; Knuth in Engler, Pflanzenr. IV, **129,** 60, fig. 11 *O–Q* (1912).

British Somaliland. Sugli, Al Hills, 10° 58′ N., 48° 53′ E., exceedingly common in shady spots, growing in leaf-mould in shade of bushes and rocks, 1420–1800 m., 15 Nov. 1929, *Collenette* 289 :—plants in fruit only ; none seen in flower.

This is the first record from Tropical Africa of this remarkable species, hitherto known only from Arabia. The development of pairs of horn-like hooks on each fruiting carpel at once distinguishes it from other annual species of similar habit.

E. Milne-Redhead.

Hypericum oligandrum *Milne-Redhead*, sp. nov. [Hypericaceae] ; affinis *H. peplidifolio* A. Rich, sed pedicellis brevibus, sepalis et petalis haud glandulis nigis punctàtis, staminibus circiter 12 irregulariter dispositis, ovario globoso stylis 5 brevibus instructo facile distinguenda.

Herba perennis, gracilis, glabra. *Cailes* decumbentes, foliosi, internodiis 8–20 mm. longis, plus-minusve quadrangulares. *Folia* sessilia, patentia, oblongo-ovata vel ovata, usque 10 mm. longa et 5 mm. lata, apice rotundata, basi obtusa leviter amplexicaulia, margine undulata, minutissime et inconspicue glanduloso-punctata, marginem versus haud glandulis nigris punctata. *Flores* solitarii, terminales. *Pedicelli* 2·5–4 mm. longi. *Sepala* inaequalia, oblongo-lanceolata, usque 4 mm. longa et 1·5 mm. lata, apice obtusiuscula, longitudinaliter pellucido-striata, haud punctata ; lateralia angustiora et breviora. *Petala* obovato-oblonga, leviter obliqua, usque 3·5 mm. longa et 2 mm. lata, apice rotundata, haud punctata. *Stamina* circiter 12, irregulariter dispositer, libera vel basi breviter connata ; filamenta circiter 3 mm. longa ; antherae 0·3 mm. longae connectivo haud glandulifero. *Ovarium* subspherioideum, circiter 1·5 mm. diametro, 1-loculare ; styli 5, distincti, circiter 0·4 mm. longi. *Capsula* late ovoidea, circiter 3·5 mm. diametro stylis persistentibus coronata. *Semina* cylindrica apicibus obtusis, circiter 0·7 mm. longa et 0·3 mm. diametro, longitudinaliter striata et inter strias reticulata.

Northern Rhodesia. Mwinilunga District. River Lunga near Mwinilunga just below junction with R. Mudjanyama, forming masses around taller herbs on river bank in open, 25 Nov. 1937, *Milne-Redhead* 3399 :—perennial ; shoots rooting and branching below ; leaves rather pallid, margin undulate ; petals very pale apricot yellow ; stamens, styles and ovary yellow.

This plant, which at first sight suggests *H. peplidifolium* A. Rich., is readily distinguished from that species by a number of characters, the more important of which are given in the diagnosis above. Among herbaceous *Hyperica* there are very few species with a 5 carpellary ovary, and on this character alone *H. oligandrum* falls into Section *Humifusoideum* R. Keller, a section which consists of one other species, *H. natalense* Wood et Evans, besides *H. peplidifolium*, both species being African. The stamens in *H. oligandrum* are remarkably few in number and do not appear to be arranged in definite bundles ; some are separate, others have the filaments shortly united at the base, and their arrangement around the ovary seems to be quite indefinite. In this respect *H. oligandrum* is anomalous in

Section *Humifusoideum*, but nevertheless I feel that this species is more closely allied to *H. peplidifolium* than to any other species of *Hypericum*. I have seen no capsules that have dehisced naturally ; many which opened in the press split along one or two sutures only. It seems therefore that the capsule may be described as tardily dehiscent and shows a tendency towards the indehiscent capsule of *H. peplidifolium*.

Hypericum stolzii *Briq.* [Hypericaceae] in Ann. Conserv. & Jard. Bot. Genèv. **20**. 391 (1919).

Hypericum thoralfi T. C. E. Fries in Notizbl. Bot. Gard. Berl. **8**, 566 (1923). *Hypericum humbertii* Staner in Bull. Jard. Bot. Brux. **13**, 69 (1934).

Belgian Congo. Kanzibi Marsh, in mountains east of Lake Kivu, Jan. 1929, *Humbert* 7503 (type gathering of *H. humbertii* Staner). Between Mt. Sabin and Mt. Gahinga, 2600 m., 1934, *de Witte* 1989.

Uganda. Kigezi District. Kinaba Gap, in small marshy places between hills, 2350 m., Dec. 1938, *Chandler & Hancock* 2620 :—straggly habit, 3 dm. or more among neighbouring vegetation ; flowers reddish-orange. Behungi, in swamp meadow, 2100 m., 19 Dec. 1933, *Thomas* 1058 :—common prostrate, woody, ascending to 6 dm. ; flowers tawny yellow. Behungi Swamp, locally common on banks of ditch along side of path crossing marsh, 2400 m., 1 Dec. 1930, *Burtt* 2941 :—flowers yellow. Toro District. Mt. Ruwenzori, in swamp, 2850 m., Aug. 1938, *Purseglove* 244. Bugishu District. Bulambuli, locally abundant among moss by stream, 2700 m., 4 Sept. 1932, *Thomas* 570 :—procumbent light green herb.

Kenya. Trans Nzoia District. Mt. Elgon, 2700 m., Mar. 1935, *Thorold* 2744. Fort Hall District. Aberdare Mts., Kinangop, on footpath in moorland, 3000 m., 21 Dec. 1930, *Napier* 705 :—procumbent herb ; flowers yellow. Nyeri District. West side of Mt. Kenya, in damp places near Forest Station, 2300 m., 26 Dec. 1921, *Fries* 326 (type gathering of *H. thoralfi* T. C. E. Fries).

Tanganyika. Bukoba District. Kishanda, in moist situation, 1350 m., Dec. 1931, *Haarer* 2338. Morogoro District. Uluguru Mts., Lukwanguli, in damp valley in the grassy plateau, 2400 m., 4 Jan. 1934, *Michelmore* 911 :—habit of *H. humifusum* but smaller ; a bog plant. Rungwe District. Kyimbila, without precise locality and data, 1913, *Stolz* 2223 (type of *H. stolzii* Briq. in Herb. Delessert).

There is an element of doubt about the type gathering of *H. stolzii*, as the label is without data. This specimen was not distributed by Kew, and Stolz 2223 in the Kew Herbarium is a species of *Lindernia* [Scrophulariaceae], also without data. It may well be that Stolz collected the *Hypericum* on Rungwe Mt. or elsewhere in the neighbourhood, but this should not be taken for granted until it is confirmed by another gathering. The possibility of the label not belonging to the specimen should not be overlooked.

This very distinct species is now known from a number of the East African Mountains. It varies considerably in size and vigour as does *H. peplidifolium* A. Rich. with which it has much been confused. It can at once be distinguished from *H. peplidifolium* by the leaves not having large

pellucid dots, by the absence of black marginal glands on the sepals and petals, and by the styles being only three in number. This last character serves to separate it from *H. oligandrum* Milne-Redhead, with which it has, a strong superficial resemblance.

I am grateful to the Director of the Conservatoire et Jardin Botaniques, Genève, for the loan of the type specimen of *H. stolzii* from the Delessert Herbarium.

E. Milne-Redhead.

Corchorus hochstetteri *Milne-Redhead*, nom. nov. [Tiliaceae].

C. echinatus Hochst. ex Garcke in Schweinf., Beitr. Pl. Aethiop. 45 (1867), non *C. echinatus* Benth., Fl. Austr. **1,** 276 (1863), nomen illegit.

Abyssinia. Without locality, *Schimper* 170.

A.-E. Sudan. Gallabat, 1865, *Schweinfurth* 2477, 2478 ; Toxswana, Nov. 1933, *Andrews* 68.

Kenya. Homa Bay, 1200 m., July 1934, *Napier* (*Coryndon Museum* no. 6737).

Tanganyika. Moshi District. Mpololo 1050 m., Aug. 1928, *Haarer* 1544. Kondoa District. Kikori, 1250 m., April 1930, *Burtt* 2693. Singida District. Ngasi's near Ndindindi Mbuga, 1230 m., 2 Mar. 1928, *Burtt* 1372.

It appears that this weed is extending its distribution southwards and that it is now common locally in Tanganyika. A new name is necessary, as *C. echinatus* Hochst. ex Garcke is a later homonym of *C. echinatus* Benth. which is an illegitimate synonym of *Corchorus macropetalus* (F. Muell.) Domin. Under Art. 61 of the International Rules of Botanical Nomenclature Hochstetter's name is illegitimate although the earlier homonym is itself an illegitimate name.

Oldfieldia somalensis (*Chiov.*) *Milne-Redhead*, comb. nov. [Euphorbiaceae].

Cecchia somalensis Chiov., Fl. Somala **2,** 397 (1932).

Somaliland. Alto Juba, Dalleri, 15 July 1929, *Senni* 289 (type in Florence Herb.) :—native name " Uami".

Kenya. Mida, 30 m., *Elliot* (*Kenya Forestry Herb.* no. 1547) :—tree with white flowers. Gongoni Forest Witu, Oct. 1937 *Dale* (*Kenya For. Herb.* no. 3823) :—a large timber tree ; appears to differ from Elliot 1547 and Dale 3824 in hairiness and size of leaves. Near Ankish, N. of Lamu, in bush, Oct. 1937, *Dale* (*Kenya For. Herb.* no. 3824) :—small tree ; ripe fruits yellow. Adu, N. of Giriama, Jan. 1937, *Dale* (*Kenya For. Herb.* no. 3654) :—tree 20 m. scattered through the drier forests ; bark brown, fissured. Kilifi District. Sokoke forest, 9 Aug. 1937, *Moggridge* 320 (Amani Herb.) ; Kilifi, 60 m., 17 May 1937, *Moggridge* 397 (Amani Herb.).

Tanganyika. Moa District. Mtotohovu, common but scattered in association with *Cynometra* and *Royena* in closed evergreen coastal forest on pale brown sandy soil, c. 30 m., 8 Dec. 1935, *Greenway* 4236 :—a branched evergeen tree with pale grey fissured bark, up to 12 m. tall ;

the scent of the flowers is said to kill dogs if they sleep beneath the tree. Moa, 100 m. *Bally* 67 :—animals under the tree for long are supposed to die. Moa, 7 May 1935, *Bally* 6880 (Amani Herb.). Lindi District. Masasi, on reddish sandy loam in *Brachystegia* woodland inselberg community, *Gilman* 1207 (Amani Herb.):—small tree, 4 m. high with small green flowers.

The genus *Cecchia* Chiov. is said to differ from *Oldfieldia* Benth. et Hook.f. in its ovary and fruit being bilocular and in the latter not splitting into three cocci. Examination of material of the West African *Oldfieldia africana* Benth. et Hook. f., hitherto the only known species of the genus, shows that, whilst it normally has 3-valved fruits it sometimes has them 2-valved. The manner of dehiscence of the fruits is exactly similar in *Oldfieldia* and *Cecchia* and it appears that Chiovenda has been misled by Hutchinson's use of the word " cocci". I therefore hav no hesitation in reducing *Cecchia* to the synonymy of *Oldfieldia*.

The Kenya and Tanganyika material cited above agrees well with Chiovenda's description and illustration of *Cecchia*, and had been determined at Kew as an undescribed species of *Oldfieldia*. The writer is indebted to Mr. P. J. Greenway for calling his attention to the possible identity of these gatherings with Chiovenda's genus, and for sending material from the Amani Herbarium on loan for examination.

Euphorbia geniculata *Orteg.* [Euphorbiaceae], Hort. Matr. Dec. 18 (1797) ; DC., Prodr. **15** (**1**), 72 (1862).

Nigeria. Jebba, 35 m., 10 Dec. 1927, *Hagerup* 715.

A.-E. Sudan. Gezira Research Farm, *Andrews* K8.*

Tanganyika. W. Usambara Mts., Makuyuni, 400–1000 m., June 1935, *Koritschoner* 570 :—Kiswahili name " Kamboza". Morogoro District, plains, 460 m., 15 Febr. 1932, *Wallace* 363 :—herb, 1·2 m. ; Kiswahili name " Kipera".

Portuguese East Africa. Lugela district, Migulmi Mission, Jan. 1947, *Faulkner* K132 :—a common weed of cultivation.

Nyasaland. Makwapala Experimental Station near Zomba, 700 m., 14 Mar. 1937, Lawrence 332 :—very common at edges of fields and in old native gardens and cultivated land.

This common S. American weed has been introduced into Tropical Africa in recent years, and is likely to establish itself and extend its distribution. It was unknown in Africa when, in 1911, Brown wrote the account of *Euphorbia* for the Flora of Tropical Africa, whilst the earliest record, that from Nigeria, was received too late for inclusion in Hutchinson and Dalziel, Flora of West Tropical Africa. It is probable that to-day *E. geniculata* is far more common in Africa than the above citations suggest, for collectors are so often reluctant to collect the commonest weeds around their houses. Yet without such gatherings our knowledge of the distributions of these weeds must long remain imperfect.

*Whilst this note was in the press, I have been informed by Mr. Andrews that he has found a specimen of *Euphorbia geniculata* Orteg. in the Sudan Government Herbarium marked "Khartoum—Gezira Research Farm, 1913", which is by far the earliest known date for this weed in Tropical Africa. E.M-R.

Mr. F. W. Andrews writes " *E. geniculata* is a common weed on the Gezira Research Farm, and has increased considerably during the last ten years. It grows here so easily and rapidly that it was suggested during the war [1939–1945] as one of the possible sources of rubber, using a maceration process : its extract contains about 5 per cent. of rubber. The soil of the Gezira Research Farm is a very heavy alkaline (pH up to 9·0) clay very low in humus. I have seldom seen *E. geniculata* outside the Farm and it tends to occur here near the banks of water channels, though it also occurs as a crop weed".

E. geniculata is distinguished from the polymorphic *E. heterophylla* by the upper leaves not being panduriform, and by the absence of red blotches at the base of the upper leaves and bracts. It seems that the form of *E. geniculata* occurring in Africa has the leaves and bracts entirely green.

E. Milne-Redhead.

Vigna juncea *Milne-Redhead* [Papilionaceae] in Kew Bull. 1934, 301 (1934), descr. hic amplif.

Caules foliosi annui, basin versus erecti, superne volubiles, usque 5 dm. longi, glabri ; internodia 11–4 cm. longa. *Stipulae* lanceolatae, acutae, ecalcaratae, 3–5 mm. longae, basi 1·5 mm. latae, glabrae. *Folia* trifoliata, petiolulis exceptis glabra ; petioli usque 6·3 cm. longi, supra valde sulcata ; foliola ovato-lanceolata, haud lobata, lateralia paulum obliqua, usque 4·2 cm. longa et 2·0 cm. lata, apice subacuta, obtusa vel interdum emarginata, basi rotundata ; petioluli circiter 2 mm. longi, supra hirsuti, subtus glabri ; rhachis 5–8 mm. longa, ut petioli sulcata ; stipellae oblongo-lanceolatae, 1·5–2·5 mm. longae, acutae. *Legumen* lineare plus minusve rectum, glabrum, circiter 5·5 cm. longum et 4 mm. latum, apice acutum. *Semina* subspherica vel brevissime ellipsoidea, circiter 2·5 mm. diametro, saturate brunnea, hilo 0·5 mm. longo instructa.

Nothern Rhodesia. Mwinilunga District. Slope N. of Matonchi Farm in *Brachystegia* woodland on heavy red soil, 1300 m., 5 Oct. 1937, *Milne-Redhead* 2578 :—perennial herb ; root cylindrical ; stems 4·5 dm. high, slender, erect, leafless ; flowers mauve ; fruits already ripening. Same locality and habitat, 11 Febr. 1938, *Milne-Redhead* 4535 :—perennial with small vertical tuber ; shoots twining up old inflorescences and up grass ; stipules spreading ; leaves green ; petiole deeply grooved.

Tanganyika Territory. Iringa Province. Mbozi, common after burns in *Brachystegia–Uapaca–Parinari* woodland, 1500 m., 28 Aug. 1933, *Greenway* 3617 :—yellow-flowered perennial herb up to 3 dm. high, flowering when quite leafless ; seeds eaten ; Chinyika name " Chimambala".

The specimens here cited are additional to those already published (see K.B. l.c.). I was lucky to find this plant in flower and fruit within a few dozen yards of Matonchi Farm, where I was staying in 1937. By marking plants in flower, I was able to gather specimens in leaf several months later. There seems little doubt that the plant collected by Mr. P. J. Greenway at Mbozi belongs to this species in spite of his describing

the flowers as yellow. All the plants of *V. juncea* seen by me in the Mwinilunga District had flowers of a somewhat dull mauve. In all other respects the Mbozi plant agrees well with this species.

The nature of the leafy shoots of *Vigna juncea* confirms its suggested position in the section *Liebrechtsia* (De Wild.) as defined by E. G. Baker (Leg. Trop. Afr. 397 : 1929). It does not, however, appear to be closely allied to any other known species of *Vigna* ; in some respects it approaches *V. nuda* N.E. Br. and in others *V. pygmaea* R. E. Fries.

Nauclea latifolia Smith [Rubiaceae] in Rees, Cycl, **24**, no. 5 (1819). *Sarcocephalus esculentus* Afzel. ex Sab. in Trans. Hort. Soc. Lond. **5,** 442 (1824).

Cephalina esculenta (Afzel. ex Sab.) Schumach. et Thonn., Beskr. Pl. Guin. 105 (1827).

Nauclea esculenta (Afzel. ex Sab.) Merr. in Journ. Wash. Acad. Sci. **5,** 535 (1915).

Sarcocephalus latifolius (Smith) E. A. Bruce in Kew Bull. 1947, 31 (1947).

My attention has been called by Mr. J. E. Dandy to the paper by Merrill (Journ. Wash. Acad. Sci. **5,** 530 : 1915) " On the application of the generic name *Nauclea* of Linnaeus". This paper has been consistently overlooked by most workers on the African *Rubiaceae* who have retained the generic name *Sarcocephalus* Afzel. ex R. Br. for the genus which Merrill points out should be called *Nauclea* L. The combination recently published by Miss Bruce (l.c.) is therefore unnecessary, but the epithet *latifolius* which she adopts is undoubtedly correct for the plant Afzelius knew as the Country Fig. Merrill adopts the epithet *esculenta* (l.c. 535) incorrectly citing it as dating from Robert Brown (in Turkey, Narrative of an Expedition to explore the River Zaire usually called the Congo : 1818) whilst in fact Brown does not mention any epithet. Brown does however validate Afzelius' MS. generic name *Sarcocephalus* in this work, which is six years earlier than the generally accepted date (Sab. in Trans. Hort. Soc. Lond. **5,** 442 : 1824).

E. Milne-Redhead.

Enterospermum rhodesiacum *Brem.* sp. nov. [Rubiaceae] ; ab *E. littorali* Hiern internodiis longioribus, foliis acuminatis siccitate haud conspicue discoloribus margine haud recurvatis, stipulis carinatis distinguenda.

Arbor circiter 8 m. alta. *Rami* ex internodiis 2–6 cm. longis compositi, novelli complanati, glabri, vetustiores subteretes, cortice griseo opaco vestiti. *Folia* opposita, petiolo angustissime alato 1–1·5 cm. longo instructa ; lamina ovato-oblonga, apicem versus contracta, apice ipso tamen obtusa et ibidem callosa, basi acuta, margine incrassato haud revoluta, glaberrima, supra nitida, subtus subopaca, siccitate haud conspicue discolor, supra olivacea costa nervisque albidis ornata, subtus dilute viridis, costa subtus prominula, nervis utroque latere costae plerumque 6, pluribus axillis acarodomatiis ore pilosis instructa, reticulatione densa subtus conspicua. *Stipulae* oblongae, 6–9 mm. longae et 3 mm. latae, subacutae, carinatae, extra intusque glabrae, mox deciduae. *Inflorescentiae* pedunculo 5–5·5 cm. longo elatae, multiflorae ; ramuli

primarii axi paulo longiores, foliis magnitudine redactis instructi, alii bracteis triangularibus vel subulatis usque ad 2·5 mm. longis suffulti, omnes glabri, ultimi verruculosi. *Flores* bracteolis subulatis 1 mm. longis instructi, flos medianus cuiusque triadis sessilis, laterales pedicello vix 1 mm. longo elati. *Ovarium* ovoideum, 0·8 mm. altum, biloculare, utroque loculo plerumque ovulis 2, raro 3 vel 1 munito. *Calyx* fere ad basin in lobos 5 ovario subaequilongos partitus ; lobi oblongi, subacuti, apice callosi. *Corolla* extra glabra, tubo 3 mm. longo et 1 mm. diametro intus dimidio superiore breviter piloso, lobis ovato-oblongis obtusis 3 mm. longis et 1·5 mm. latis intus glabris. *Stamina* filamentis glabris 0·7 mm. longis, antheris corollae lobis subaequilongis. *Discus* annularis, humilis, glaber. *Stylus* corolla paulo longior, sub receptaculo pollinis hirtellus ; receptaculum pollinis antheris paulo brevius ; stigmata tota cohaerentia. *Drupa* globosa, 6 mm. diametro, monosperma ; semen globosum, 3 mm. diametro, brunneum, hilo parvo et ruminatione pro genere typicis.

Southern Rhodesia. Matabeleland, World's View in the Matopos, 32 Km. south of Bulawayo, in pocket of soil on granite inselberg, flowering and fruiting May 1947, *R. W. J. Keay* in *F. H. I.* 21294 (type in Kew Herb.).

The new species differs from *E. littorale* Hiern, the other species from the African continent, in the greater length of the internodes, the entirely flat acuminate leaves, which are in herbarium material not conspicuously discoloured, and the carinate stipules. In the structure of the inflorescence and of the flower no important differences are found.

The genus *Enterospermum* Hiern is now known from the Mascarenes (*E. coriaceum* (Baker) Brem.), from Madagascar (*E. gracile* (A. Rich.) Brem.) and from the African continent. Its distribution is therefore similar to that of the genus *Danais* Commers. ex Vent*; on the African continent its area extends, however, somewhat farther inland.

The position of the genus deserves a closer inspection. The ruminate endosperm reminds one of the genus *Rutidea* DC., which, however, has but a single ovule in each of its ovary cells ; this ovule, moreover, is reniform and inserted on the top of a fleshy placenta rising from the lower part of the septum. In *Enterospermum* there are, as a rule, two collateral ovules, and these hang down from a rather small, though fleshy, placenta, which is attached to the upper part of the septum. This kind of placenta is found also in *Tarenna neurophylla* (S. Moore) Brem., whose seeds, however, are not provided with a ruminate endosperm. This plant, moreover, lacks the acarodomatia of *Enterospermum*, and has a somewhat different type of stipule. The majority of the *Tarenna* species, on the other hand, are provided with larger placentas, in which the ovules are deeply immersed.

The type of placenta found in *Enterospermum* and in *Tarenna neurophylla* recurs in the genera *Galiniera* Del. and *Kraussia* Harv. emend. Bullock, and in these genera the seeds are, like those of *Enterospermum*, provided with a ruminate endosperm. Their inflorescences, however, are axillary. In both these genera the ovary cells may contain solitary or collateral ovules, and their difference does not lie therefore in the number of the latter but mainly in the absence or presence of a ring of silky hairs in the corolla

*See Bremekamp in Kew Bull. 1948, 188 (1948).

tube. When each of the ovary cells contains but a single ovule, the placenta is of the type that is thought to characterize the *Alberteae*, but this tribe can in its present delimitation hardly be kept up. *Galiniera* and *Kraussia* occupy in my opinion a similar position with regard to *Tricalysia* A. Rich. as *Enterospermum* does to *Tarenna*.

C. E. B. Bremekamp.

Otomeria linearifolia *Brem.*, sp. nov. [Rubiaceae] ; statura parva et foliis linearibus a congeneribus distinguenda.

Fruticulus valde ramosus, 15–20 cm. altus. *Rami* novelli 0·6 mm. diametro, rubri, dense albo-pubescentes, deinde usque ad 1·5 mm. diametro incrassati, glabrescentes et cortice saturate brunneo vestiti ; internodia 5–10 mm. longa. *Folia* sessilia, linearia, 10–18 mm. longa et 0·8–1·5 mm. lata, apice acuta et mucronulata, margine revoluta, basin versus sensim attenuata, utrinque breviter pubescentia, supra basin versus canaliculata, costa subtus prominula, nervis lateralibus inconspicuis. *Stipulae* breves, dentibus tribus 1–2 mm. longis coronatae, ut caulis rubrae et albo-pubescentes. *Flores* in axillis foliorum superiorum solitarii, sessiles. *Ovarium* turbinatum, dense albo-pubescens, 1·8 mm. altum. *Calyx* in lobos plerumque valde inaequales 2–4 mm. longos partitus. *Corolla* extra pubescens, tubo 11–14 mm. longo in flore dolichostylo 4 mm. infra os paulo dilatato intus infra insertionem staminum sparse piloso supra insertionem dense barbato, lobis 5–7 mm. longis et 2·5–3·0 mm. latis acutis facie interna farinosis. *Stamina* in flore dolichostylo 4 mm. infra os inserta ; filamenta 0·8 mm. longa ; antherae 2 mm. longae. *Stylus* glaber, in flore dolichostylo 1·6 mm. exsertus ; stigmata 2 mm. longa. *Drupa* matura nondum visa.

Northern Rhodesia. Mumbwa District. Nambala Hill†, about 19 Km. S. of Mumbwa, 1911, *Mrs. Macauley* 775 :—rock plant ; flowers pale blue.

Rauwolfia nana *E. A. Bruce*, sp. nov. [Apocynaceae] ; a congeneribus habitu nano et rhizomatibus lignosis elongatis valde diversa.

Suffrutex perennis usque 15 cm. altus, caulibus pluribus e rhizomate ortis. *Rhizoma* lignosum, pallido-brunneum, horizontaliter elongatum, circiter 40 cm. longum et usque 5 mm. diametro. *Caules* erecti, simplices vel raro ramosi, plus minusve sulcati, internodiis 1·5–4 cm. longis. *Folia* glabra, integra, flavido-viridia, subtus pallidiora, opposita vel subopposita, interdum fere veticillata, subsessilia vel breviter petiolata, magnitudine varia ; infirma multo redacta, squamiformia, circiter 3 mm. longa, superiora caulium apicem versus gradatim majora et longiora, demum usque 7 cm. longa, 1 cm. lata, oblanceolata, apice rotundata vel subacuta, interdum breviter mucronata, basi longe attenuata et in petiolum indistinctum decurrentia, basi utrinque glandulis binis angustatis vix 0·5 mm. longis instructa ; nervi laterales inconspicui, utrinsecus circiter 4–7. *Flores* brevissime (circiter 4 mm.) pedunculati, in cymas 3–6 floras axillares dispositi ; pedicelli circiter 3 mm. longi, glabri.

†I am informed by Mr. J. P. M. Brenan that, when he visited Nambala Hill in company with Mr. P. J. Greenway in 1947, he observed *Otomeria linearifolia*, but did not take a specimen as the plant was not in flower. E. M.-R.

Calyx eglandulosus, lobis ovato-deltoides circiter 1·5 mm. longis apice subacutis minutissime papillosis. *Corollae tubus* circiter 5 mm. longus, 2 mm. diametro, extra viridi-flavidus, superne intus leviter pubescens, fauce densissime villosus ; lobi leviter recurvo-patentes, 2·5 mm. longi, 1 mm. lati, oblongi, apice rotundati, extra subflavi et minute papillosi, intus cremei, marginibus sinistris aestivatione obtegentibus. *Stamina* infra faucem corollae inserta, filamentis brevissimis ; antherae oblongae, circiter 1 mm. longae, basi breviter apiculatae. *Discus* cupuliformis, circiter 1 mm. altus. *Stigma* glanduloso-papillosum, circiter 1 mm. latum, apice anguste bilobatum, basi annulo deflexo instructum ; stylus 2 mm. longus, glaber. PLATE 2.

NORTHERN RHODESIA. Mwinilunga District. Near the Source-of-Matonchi Dambo, in *Cryptosepalum* woodland on sand, 16 Nov. 1937, *Milne-Redhead* 3264 :—perennial with long rhizome ; leaves more or less opposite, yellow-green ; corolla-tube greenish-yellow outside, cream inside ; tube blocked up by " corona scales ".

The genus *Rauwolfia* L. comprises trees and shrubs, so the above species with its rhizomatous habit and dwarf annual shoots is a striking addition. Its nearest ally as regards size is *R. oreogiton* Markgr., a species from the Usambara Mts. in Tanganyika which is described as a shrub 1 m. high.

Measurements in the description of the flowers have been taken from material preserved in spirit solution.

Brachystelma prostratum *E. A. Bruce*, sp. nov. [Asclepiadaceae] ; quoad habitum nanum et foliorum florumque indolem *B. keniensi* Schweinf. affinis sed caulibus prostratis lobis corollae latioribus pilis albidis longis ornatis distincta ; quoad coronae structuram *B. Hettoni* (Harv.) N. E. Br. affinis sed corona exteriore globoso-urceolata differt.

Herba perennis, tubere leviter compresso sphaerico circiter 3 cm. diametro, caule brevi erecto circiter 1 cm. longo cum tubere subterraneo. *Caules* 3–5, humistrati, radiati, 4–6 cm. longi, tenuiter suberecto-pubescentes, internodiis 6–10 mm. longis. *Folia* stricte erecta, subsessilia vel breviter petiolata, glabra, varia, aut linearia circiter 1·3 cm. longa, 1 mm. lata, margine revoluta, aut lanceolata 8 mm. longa, 2 mm. lata, margine irregulariter undulata, apice acuminata, basi cuneata. *Flores* inconspicui, in axillis foliorum superiorum solitarii, pedicelli 4–5 mm. longi, pubescentes, virides, rubro-notati. *Calyx* 5-lobatus, viridis, rubro-notatus ; lobi lineari-subulati, 4–5 mm. longi, subglabri, lobis corollae subaequilongi. *Corolla* parva, paullulo ultra medium 5-lobata, extra glabra, intus basin versus pilis albidis longis ornatis ; tubus aperta campanulatus, circiter 2 mm. longus, intus brunneo-ruber ; lobi patuli, ovato-triangulares, 3·5 mm. longi, basi 2·5 mm. lati, apice acuti, carnosi, et intus traverse rugulosi. *Corona* duplex, puniceo-rubra ; corona exterior glabra, globoso-urceolata, columnam staminalem superam, circiter 2 mm. alta, obscure 5-angulata, lobis 5 subquadratis concavis bicornutis, cornubus loborum adjacentium lobi interiores minute, deltoidei, 0·5 mm. longi, basi ad mediam lobam coronae exterioris dorsaliter adnati et antheris oppositi, decumbentes, antheras haud superantes. *Antherae* aurantiacae. *Stigma* albidum. PLATE 3.

NORTHERN RHODESIA. Mwinilunga District. SW. of Matonchi Farm, on shallow soil overlying " laterite " in open, with *Ceropegia filiformis*

Plate 2

Type specimen of *Rauwolfia nana* E. A. Bruce

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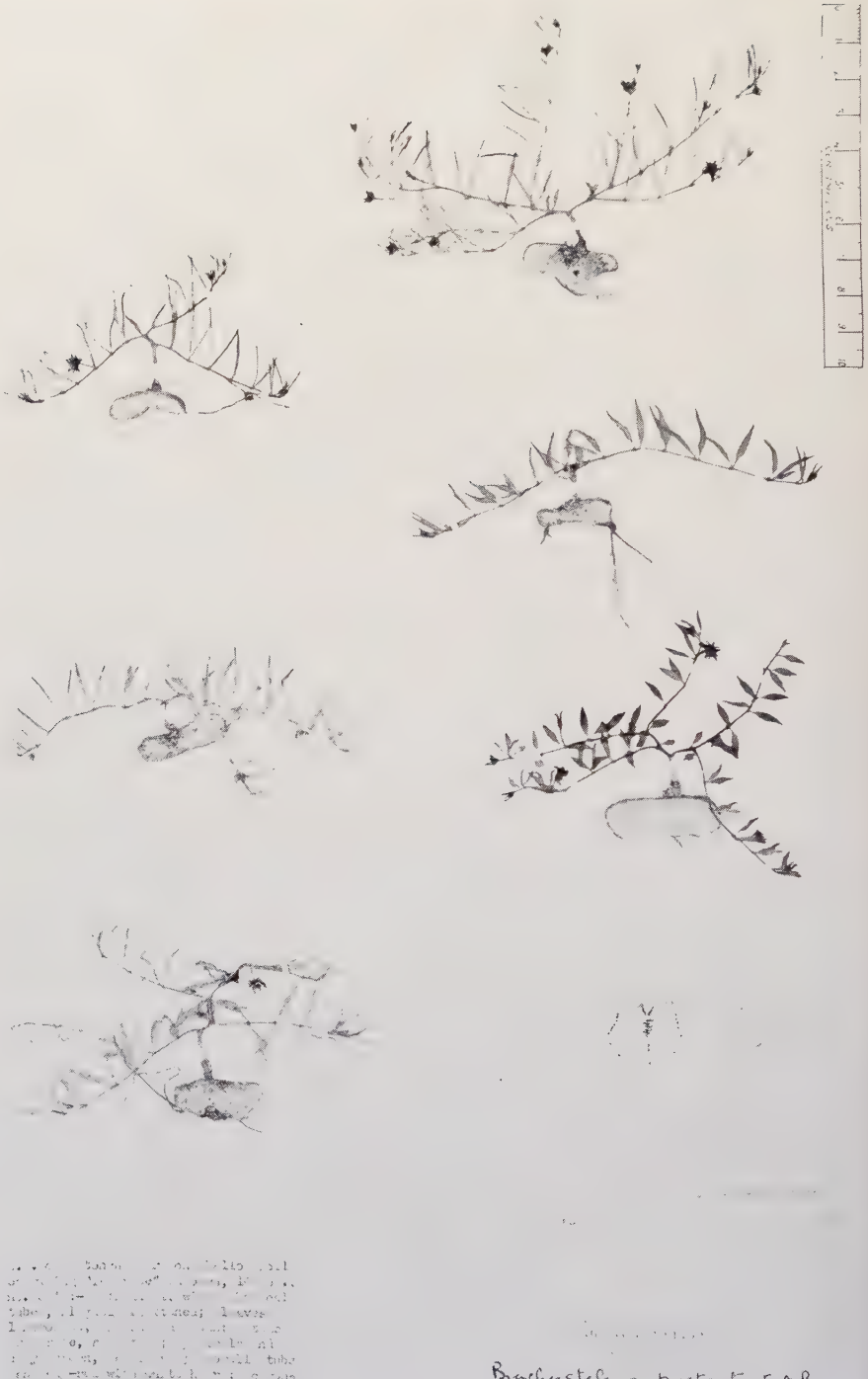
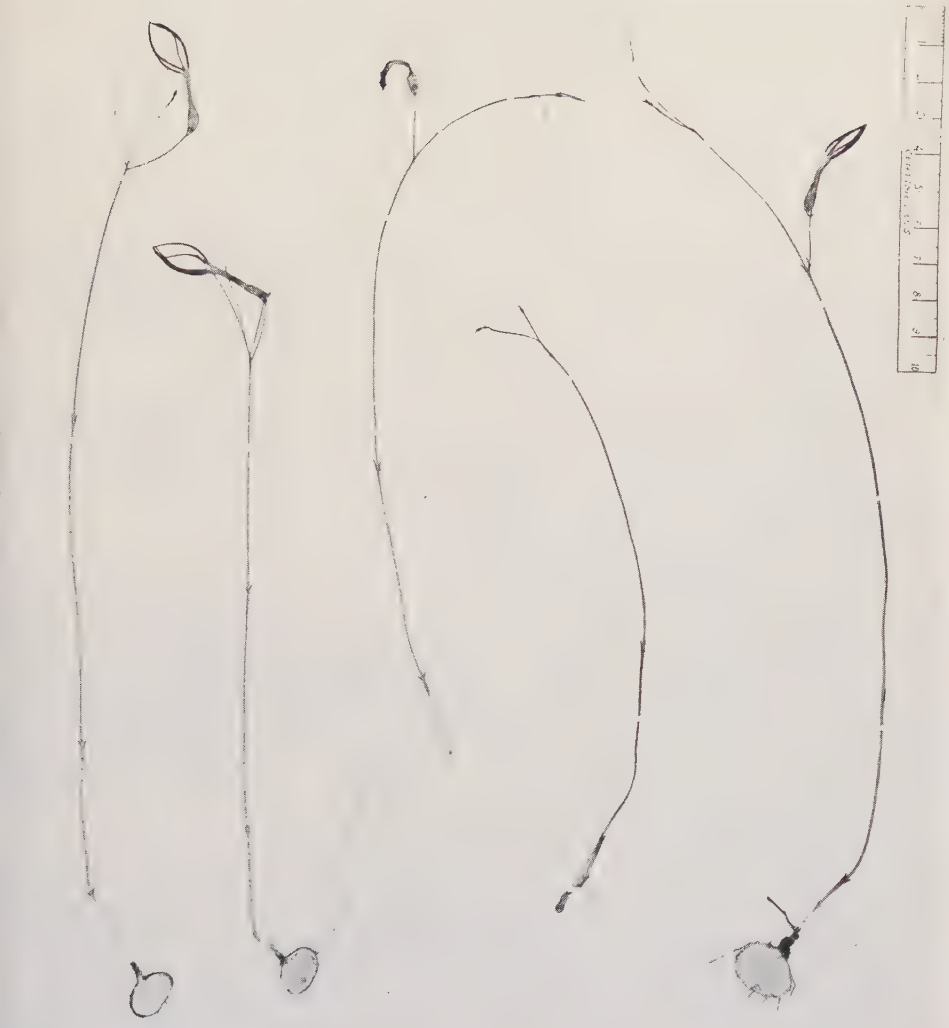


Type specimen of *Brachystelma prostrata* E. A. Bruce

PLATE 4



S.W. of Matanchi farm on shallow soil overlying "laterite" [illegible], [illegible], no. [illegible]— [illegible] tuber, 1 in. in diameter; [illegible] with 2-3 pairs of [illegible] leaves; pedicels [illegible]; calyx [illegible]; corolla [illegible]; lobes olive-[illegible], [illegible] white, mauve [illegible].

HERBARIUM KEWENSE
NORTHERN RHODESIA

Ceropegia [illegible] n. [illegible] sp. nov.

[illegible]

Type specimen of *Ceropegia filiformis* E. A. Bruce

Plate 5

Ceropegia rostrata E. A. Bruce (Milne-Redhead 3702A)

E. A. Bruce, 14 Nov. 1937, *Milne-Redhead* 3242 :—perennial with slightly flattened subspherical tuber ; leaves lanceolate, varying in width ; stems prostrate, radiating ; pedicels and calyx green, marked red ; corolla tube mahogany-red with white hairs ; corona pinkish-red ; anthers orange ; stigma white ; flowers with foetid smell, very inconspicuous growing on soil full of nodules of iron oxide.

This inconspicuous little plant is characterized by a prostrate habit. The stems radiate from a central point and lie close to the ground, whilst the leaves stand up erectly in pairs. The outer-corona is unusual in shape and resembles a minute goldfish-bowl completely enclosing the staminal column ; the inner corona lobes are represented as small teeth attached to the inside centre of each outer-lobe, just above the base. The measurements in the description have been taken from spirit material.

Ceropegia filiformis *E. A. Bruce*, sp. nov. [Asclepiadaceae) ; quoad habitum erectum et tuberum indolem *C. campanulatae* G. Don affinis, sed foliis redactis floribus minoribus glabris differt.

Herba perennis, erecta, simplex, haud scandens, 18–28 cm. alta. *Tuber* sphaericum, circiter 1·5–2·5 cm. diametro. *Caulis* gracilis, strictus, viridis, glaber, circiter 1 mm. diametro, internodiis 4–9 cm. longis. *Folia* erecta, sessilia, glabra, per paria 3–4 in quoque cauli disposita ; inferiora redacta, triangularia, circiter 2 mm. longa, basi 0·7 mm. lata ; superiora gradatim elongata, demum filiformia, ultima 3 cm. longa, 0·3 mm. lata, margine revoluta. *Flores* erecti, in axillis foliorum superiorum solitarii ; pedunculus nullus ; pedicelli graciles, 1·5–2 cm. longi, glabri, rubescentes, plus minusve erecti. *Calycis lobi* lineari-subulati, rubescentes, glabri, circiter 2 mm. longi. *Corolla* glabra, 3–3·5 cm. longa ; tubus puniceo-albidus, basi per 7–8 mm. obovoideo-inflatus et circiter 5 mm. diametro, intus tenuiter longitudinaliter sulcatus, deinde abrupte constrictus, per 7–8 mm. cylindricum et 2 mm. diametro, fauce haud ampliatus ; lobi 5, lineares, olivacei vel brunnei, replicati, circiter 2 cm. longi, 1 mm. lati apice connati, structuram angusto-ellipsoideam aportam affortmantes. *Corona* duplex, albida, hyalina ; lobi exteriores basi in cupulam brevem connati, superne 5-labati, lobis bicornutis, cornubus linearibus vix 1 mm. longis apice setis 1–2 albidis sericeis coronatis ; lobi interiores erecto, conniventes. lineari, subulati, glabri, 1·5–2 mm. longi, apice brevissime recurvati. PLATE 4.

NORTHERN RHODESIA. Mwinilunga District. SW. of Matonchi Farm, on shallow soil overlying " laterite " in open, with *Brachystelma prostrata* E. A. Bruce, 14 Nov. 1937, *Milne-Redhead* 3241 (type) :—perennial with sphaerical tuber, 2·5 cm. in diameter ; stems wiry with 2–3 pairs of reduced leaves ; pedicels reddish ; calyx reddish ; corolla tube white tinged pinkish ; lobes olive-green or brown ; throat white, mauve inside tube. Kalenda Plain, N. of Matonchi Farm, 24 Dec. 1937, *Milne-Redhead* 3241A.

This new *Ceropegia* is unusual in having very reduced pairs of leaves in the lower part of the stem, whereas the uppermost pair, though very slender, is usually better developed. As *C. filiformis* flowers during the wet season, it is unlikely that separate shoots with well developed leaves are produced, and it is probable that the green stem aids in the assimilatory functions. The species appears to be most closely allied to an un-

named specimen collected in the Gold Coast by Mr. C. Vigne (no. 4511). This shows a similar habit, leaf reduction and coronal structure as *C. filiformis*, but differs in the shape and pubescence of the corolla. Measurements in the description of the flowers have been made from material preserved in spirit solution.

Ceropegia rostrata *E. A. Bruce*, sp. nov. [Asclepiadaceae] ; affinis *C. umbraticolae* K. Schum. sed tubo corollae subcurvato multo latiore in medio (nec basi) latissimo, lobis basi setis longis albidis ornatis differt.

Herba perennis, circiter 40 cm. alta. *Radices* numerosae (25–50), crassae et carnosae vix tuberosae, usque 20 cm. longae, 3–4 mm. diametro. *Caulis* simplex, erectus, quadrangularis, basi 4 mm. diametro, basin versus subglaber, superne (apicem versus densius) hispidus, internodiis 1·5–10 cm. longis inferioribus longioribus. *Folia* erecto-patentia, petiolata ; petioli circiter 1 cm. longi, dense hispidi ; lamina anguste elliptica vel oblongo-elliptica, 4–6 cm. longa, 1–2 cm. lata (superioribus minoribus), apice obtusa vel subacuta, basi rotundata vel late cuneata, utrinque pilis brevibus albidis substrictis patentibus hispida, inter nervos glabrescentia, margine (siccitate) undulato dense hispido, nervis lateralibus utrinsecus 3–4 adscendentibus. *Flores* in axillis foliorum supremorum solitari, vel inferne 2–3, fasciculati ; pedicellus 1–1·5 cm. longus, cicatricibus pedicellorum disciformibus pallidis in axillis foliorum superiorum dispositis. *Lobi calycis* lanceolati, 6–8 mm. longi, basi 1·5–2·5 mm. lati, apice anguste acuminati, extra hispidi, intus glabri. *Corolla* circiter 7·5 cm. longa ; tubus inflato-subellipsoideus, 4 cm. longus, 2 cm. latus vel (siccitate) subcurvato-cylindricus basi angustatus, circiter medium latissimus, 5 cm. longus, 1·7 cm. latus, extra glaber vel interdum triente superiore parce pubescens, intus glaber ; lobi apice cohaerentes, rostrati, e basi deltoidea lineares, 3·2–3·7 cm. longi, basi circiter 5 mm. lati, replicati, superne parce hispiduli vel subglabri, basi intus pilis longis strictis albidis ornati. *Coronae* lobi exteriores basi in cupulam circiter 3·5 mm. altam fauce 7 mm. diametro dispidam connati, lobis apice bicornutis, cornubus linearibus plus minusve incurvo-conniventibus 2·5 mm. longis gynostegium superantibus setis paucis albidis ornatis ; lobi interiores cum exterioribus alternantes, e margine cupulae orti, super antheras horizontaliter incumbentes apice se attingentes. PLATE 5.

NORTHERN RHODESIA. Mwinilunga District. Just SE. of Dobeka Bridge, in *Brachystegia* woodland on slope on sandy ground, 15 Dec. 1937, *Milne-Redhead* 3702 (type) :—perennial with very many thick and fleshy, scarcely tuberous roots ; stem erect, dull green, pubescent ; leaves dull green with midrib and petiole tinged pink ; only one flower ; pedicel pinkish ; calyx yellow-green, tinged reddish towards the tips of the segments ; corolla large, white in the lower part, becoming speckled with purplish-brown about the middle, then deep purplish-brown towards the top ; lobes bright yellow-green inside, yellow green speckled with purplish-brown outside ; beginning of lobes dull yellow inside ; throat densely retiuclate deep purplish brown on whitish ; lower part of tube inside striped with deep green nerves on whitish ; corona lobes yellowish to purplish-brown ; only one plant seen. Near source of R. Ysongalu in *Brachystegia* woodland, 31 Dec. 1937, *Milne-Redhead* 3702A :—another single plant of *Milne-Redhead* 3702.

This species is very close to *C. umbraticola* K. Schum. Unfortunately there is only one leaf and a dissected flower of the type for comparison. The leaf of *umbraticola* is identical with those of *C. rostrata*. The flower, however, is smaller with a much narrower tube and not nearly so sausage or balloon-like as in *C. rostrata* and the long stiff white hairs near the base of the lobes are absent. The drawing of a flower of *umbraticola* in Engl. & Prantl, Pflanzenfam. IV, 2, 272 fig. 81F is *very* different from that of *rostrata*.

Specimens collected by Mr. R. M. Davies (no. 678) at Mbozi Zambi, in Southern Tanganyika and by Gossweiler (no. 2286) at Cazembe in the Cubango District, Angola, are very closely allied to *C. rostrata*, but they both differ from it in the smaller flowers and in the absence of the long white setae at the base of the corolla lobes. *Davies* 678 has hair-like tips to the outer corona-lobes, and the *Gossweiler* specimen has much broader leaves, which are cordate or subcordate at the base.

Mr. Milne-Redhead informs me that at each of the two localities where he found *C. rostrata* growing, a single plant only was seen, each with only one flower. It seems that the species does not readily set fruit, for on the two specimens examined there were 13 scars of fallen flowers.

Ceropegia yorubana *Schltr.* [Asclepiadaceae] in Engl., Bot. Jahrb. **38**, 48 (1905) ; Hutch. et Dalz., Fl. W. Trop. Afr. **2**, 63 (1931).

Gold Coast. Abokobi, in thickets, Febr. 1933, *Irvine* 1989 :—delicate twiner ; flowers yellowish green covered with reddish spots in centre ; tip of flower black. Six Km. north of Achimota, in evergreen thicket, 29 Nov. 1941, *Milne-Redhead* 5169 :—climber 2–2·5 m. high ; stems and leaves glabrous except for a few hairs on petiole and leaf-margin ; leaves green above, pallid below with conspicuous nerves ; flowers usually single ; corolla mainly pale green with purple spots at top of the tube ; top third of lobes inside pilose, purple ; shape as in *C. gemmifera* K. Schum.

The above gatherings have been named from Schlechter's description and the illustration accompanying it, there being no authentic material of *C. yorubana* in the Kew Herbarium. Schlechter describes the petiole and leaf as glabrous, yet the artist shows hairs on the petiole and leaf-margin just as they occur in the Gold Coast specimens. The outer corona lobes of these gatherings are rather longer in relation to the inner ones but are essentially similar in character to those of *C. yorubana*. The hairs on the ouer lobes are difficult to observe if the corona is wet. Up to now the species has been known only from the type gathering made between Ibadan and Abeokuta in Nigeria. As the type specimen at Berlin is likely to have been destroyed, it is hoped that further gatherings from the type locality may be made.

In habit *C. yorubana* is similar to *C. gemmifera* K. Schum., a species which is frequent in the somewhat xerophytic evergreen thickets around Achimota, north of Accra, in the Gold Coast. As one goes north from Achimota the rainfall increases very rapidly, the rainfall gradient here being remarkably steep. The evergreen thickets change rapidly in constitution with the increasing rainfall, and 6 Km. north of Achimota, *C. gemmifera* is replaced by *C. yombana*, a species with less succulent stems and greater leaf development.

E. Milne-Redhead.

Chrysanthellum americanum (*L.*) *Vatke* [Compositae] in Abh. Nat. Ver. Brem. **9,** 122 (1887).

Artemisia americana L., Sp. Pl. 895 (1753), non L.f., Suppl. 378 (1781).

Bidens apiifolia L., Syst. Nat. ed. 10, 1203 (1759).

Verbesina mutica L., Sp. Pl. ed. 2, 1273 (1763), nom. illegit.

Chrysanthellum procumbens L. C. Rich in Pers., Syn. **2,** 471 (1807), nom. illegit.

Sebastiana heterophylla Bertol., Lucubr. 37 (1822), nom. illegit.

Chrysanthellina swartzii Cass. in Dict. Sc. Nat. **25,** 392 (1822), nom. illegit.

Collaea procumbens [L. C. Rich] Spreng., Syst. Nat. **3,** 622 (1826), nom. illegit.

Chrysanthellum swartzii [Cass] DC., Prodr. **5,** 631 (1836), nom. illegit.

Chrysanthellum senegalense DC., Prodr. **5,** 631 (1836).

Chrysanthellum indicum DC., Prodr. **5,** 631 (1836).

This common weed has up till now been known in Africa under the illegitimate name, *Chrysanthellum procumbens* L. C. Rich., the name frequently being attributed incorrectly to Persoon. The correct name has been in common use in America for many years. There is, in this case, no question of taxonomy involved, as *C. procumbens* and *C. americanum* are based on the same type.

E. Milne-Redhead.

Lightfootia arenicola *Meikle*, sp. nov. [Campanulaceae–Campanuleae]; *L. madagascariensi* A. DC. affinis sed statura humiliore, foliis sparsis brevioribus plerumque integris differt.

Herba perennis gracilis, erecta vel suberecta, 14–20 cm. alta. *Radix* sublignosus, ramosus. *Caules* numerosi a basi ramosi, herbacei, glabri vel raro breviter pilosi, longitudinaliter striati. *Folia* sparsa, alterna, sessilia, patentia, internodiis aequilonga vel iis longiora, inferiora lanceolata vel lineari-lanceolata acuta 5–9 mm. longa, 1–2·5 mm. lata, superiora linearia 3–6 mm. longa, 0·5–1 mm. lata, ad bracteas lineares minutissimas vix 1·5 mm. longas gradatim redacta, omnia glabra, vel rarissime sparse pilosa, integra vel dentibus minutis perpaucis ornata, margine albido incrassato. *Inflorescentia* laxe paniculata, multiramulosa, floribus numerosis breviter pedicellatis, pedicellis erectis glabris usque 1·5 mm. longis. *Calyx* 5 fidus, glaber, tubo cuneato fere 1 mm. longo et lato, laciniisque lineari-acuminatis erectis tubo aequilongis vel eo paullo longioribus 1–2 mm. longis integris cum corollae laciniis alternantibus. *Corolla* profunde 5 partita, tubo brevissimo flavido-brunneo, laciniis brunneis linearibus patentibus apice acutis circiter 3 mm. longis. *Stamina* 5, libera, usque 2·5 mm. longa, filamentis basi late rhomboideo-dilatatis pilosis. *Antherae* elongatae, $2\frac{1}{2}$–3 plo longiores quam latiores, flavae, basi emarginatae, apice obtusae vel subacutae. *Stylus* caeruleus, robustus, cylindricus, circiter 4 mm. longus, basi dilatatus, glaber, superne pilis densis caeruleis obtectus, apice in stigmata 3 brevissima obtusa divisus. *Capsula* infera hermisphaerica vel subcuneata, 1·5–2 mm. longa, 2–3 mm. lata, prominenter 5–8 nervis, 3-locularis, apice valvis 3 brevibus subacutis dehiscens. *Semina* trigona, ovoideo-acuminata, fulva, nitida, circa 5 mm. longa.

Northern Rhodesia. Mwinilunga District. Source-of-Matonchi Dambo, in open sandy ground with rhizomatous shrubs, at edge of *Cryptosepalum* woodland, 26 Oct. 1937, *Milne-Redhead* 2964 :—perennial ; leaves small ; flowering shoots much branches ; corolla tube yellowish brown, lobes brownish, spreading ; style blue, covered with blue hairs.

This species is allied to *L. madagascariensis* A. DC. but is a smaller, more compact plant ; the leaves are shorter and are usually glabrous and entire.

Solanum bifurcatum *A. Rich.* [Solanaceae], Tent. Fl. Abyss. **2,** 98 (1851).

Solanum bifurcum Hochst. MS. ; ex Duval in DC., Prodr. **13** (**1**), 77 (1852) ; Wright in Dyer, Fl. Trop. Afr. **4**(**2**), 213 (1906).

Both the above names are based on the same gathering, Schimper 201, which was distributed as *Solanum bifurcum* Hochst., a name published without a description in a list (Flora **24,** Intell. 24 : 1841). Richard altered the epithet to *bifurcatum* when he published his description of the plant one year earlier than that of Duval, who adopted Hochstetter's name.

E. Milne-Redhead.

Dopatrium luteum *Engl.* [Scrophulariaceae] in Engl., Bot. Jahrb. **23,** 498 (1897).

Gold Coast. Northern Territories : Brufo near Lawra, 300 m., on laterite flats flooded to a depth of a few inches in the rains, 18 Oct. 1947, *J. H. Hinds* 5004 : yellow and white flowered varieties intermingled. Lawra, on flat laterite sheets flooded a few inches in the rains but under intense insulation from November to April, July 1946, *J. H. Hinds* s.n.

Anglo-Egyptian Sudan. Bahr el Ghazal. Geer, Bongoland, 27 July, 1869, *Schweinfurth* 2153. Wau district, 1932, *Macintosh* 9K, 90K.

Excellent gatherings of a species of *Dopatrium* received recently from Mr. J. H. Hinds in the Northern Territories of the Gold Coast are found to be *D. luteum* Engl., a plant known hitherto only from the Bahr el Ghazal Province of the Anglo-Egyptian Sudan. Mr. Hinds records that both yellow-flowered and white-flowered forms grow together. This is of interest as albinism is rare in plants with yellow flowers, but is known to occur in *Verbascum* L., a genus which is also in the *Scrophulariaceae*.

E. Milne-Redhead.

Lippia carviodora *Meikle*, sp. nov. [Verbenaceae–Verbeneae] ; sectioni *Rhodolippiae* ut videtur affinis, ab aliis speciebus africanis valde dissimilis.

Fruticulis suaveolens, multiramosus, usque 1·5 m. altus ; cortex striatus, primo pallidus, postea griseus vel brunneo fuscus. *Rami* erecto-patentes, gracillimi, juveniles purpurascentes, subteretes vel obtuse quadrangulati, parce pubescentes, mox glabrescentes, glandulis nitidis dense obtecti. *Folia* opposita, patentia, breviter petiolata ; petioli circiter 1·0 cm. longi, tenues, pubescentes, supra canaliculati ; laminae ovatae usque 2·5 cm. longae et 1·7 cm. latae, griseo-virides, supra rugosae, nervosae, adpresso-pubescentes, sparse glandulosae, subtus

dense canescenti-puberulae, glandulis fulgidis ornatae, apice obtusae, basi subtruncatae, in petiolum subito coartatae, rarius breviter decurrentes, margine crenatae vel obtuse serratae. *Inflorescentia* axillaris, solitaria, breviter pedunculata, floribus circiter 12 in spicam parvam abbreviatam strobiliformem confertis ; pedunculus gracilis, suque 7·0 mm. longus, dense albo-tomentosus ; spica usque 5·0 mm. longa et 7·0 mm. lata ; bracteae sub anthesi ovato-lanceolatae, 4·0 mm. longae et 2·0 mm. latae, acuminatae, dense glandulosae, pilis albis sparse obtectae, post anthesin valde accrescentes, demum membranaceae, venosae, hirtellae, margine erosae, basi cordatae, apice acutae, usque 8.0 mm. longae et 15·0 mm. latae, strobilum ad instar *Humuli lupuli* Linn. efformantes. *Calyx* minutus usque 1·0 mm. longus et latus, membranaceus, dense albo-hirsutus, in lobos 2 obtusos vel emarginatos divisus, post anthesin auctus et fructum omnino obtegens ; corolla bracteas aequans vel eas paullo superans, tubus usque 4·0 mm. longus, subfuscus, striatus, extra ad basin subglaber, supra sparse pilosus. *Corollae lobi* 4, rotundati, albidi, incurvati, marginibus undulatis crenulatis, intus ad faucem livido-annulati. *Stamina* 4, didynama, 2 in parte tubi superiore affixa, paullo exserta, et 2 medio tubo affixa, filamentis brevissimis, antheris ovastis 2-locularibus. *Stylus* usque 2·3 mm. longus ; stigma oblique declinens, crassiusculum, apice truncatum vel subemarginatum. *Ovarium* subglobosum, 2-loculare, circiter 1·0 mm. latum. *Fructus* parvus, usque 3·0 mm. latus, compresso-globosus, siccus, calyce tomentoso inclusus et corolla marcida coronata, in pyrenas 2, pericarpio fusco, secedens.

Kenya. Wamba, Northern Frontier District, 4 Jan. 1948, *Gilbert Walker*, sine numero (type). Dried specimens and spirit material in the Kew Herbarium.

var. **minor** *Meikle*, var. nov. ; a varietate typica ramis pallidioribus, foliis et infructescentiae bracteis minoribus recedit.

Folia plerumque rotundata usque 1·5 cm. longa et 1·0 cm. lata. *Infructescentiae bracteae* subobtusae, circiter 5·0 mm. longae et 7·0 mm. latae vix membranaceae, pubescentes, marginibus integris saepe recurvatis.

[*Lantana microphylla* (non Franch.)—Hutch. et Bruce in Kew Bull. 1941, 176 (1941)].

[*Lantana petitiana* (non A. Rich.)—P. E. Glover, Check-list Brit. and Ital. Somal. Trees, Shrubs, and Herbs, 268 (1947)].

British Somaliland. Sheikh Pass and Maritime plain, *Major D. Thomson* 72, received at Herb. Kew., 26 Jan. 1904 (type of var.). South side of Duwi Pass, 1050 m., 19 Oct. 1932, *Gillett* 4373. Burao, very common near township in semi-desert scrub, c. 400 m., 22 Jan. 1944, *Bally* 3029 :—shrub about 12 dm. high ; Somali name " gedhamer". Burao grazing reserve, 30 Sept. 1944, *Glover* and *Gilliland* 48:—Somali name " Ged hamar".†

Kenya. Uaso Nyero area, Northern Frontier District, 4 Mar. 1935, *D. C. Edwards* 2984.

This is a very distinct species, quite unlike any other African *Lippia*, but bearing a close superficial resemblance to *Lantana petitiana* A. Rich.

†According to Glover (l.c. 375) this name is also applied by the Somalis to three species of *Lantana*.

with which it has in the past occasionally been confused ; the short peduncles, small flowers, large membranous, hop-like fruiting bracts and dry fruits distinguish it from this plant. The var. *minor*, with pale whitish bark, small leaves and fruiting bracts, looks distinct, but some specimens (e.g. Bally 3029 and Edwards 2984) approach typical *L. carviodora*, and it may be merely a starved or desiccated state of this species. The whole plant emits a powerful odour reminiscent of Carraway-seed (especially noticeable in the var. *minor*), and is said to be used by the Somalis as a substitute for tea.

Crocosmia pauciflora *Milne-Redhead*, sp. nov. [Iridaceae] ; a *C. aurea* Planch. statura minore, inflorescente simplice pauciflora, floribus minoribus facile distinguenda.

Planta glabra, rhizomatosa. *Rhioma* longe repends, squamis fibrosis dense vestitum, cormo circiter 1 cm. diametro tunicato terminatum. *Caulis* unicus, erectis, simplex, foliosus, usque 6 dm. altus. *Folia* usque 9, disticha, inflorescentiam excedentia ; folia tria infirma ad vaginis reducta ; folia superiora inferne plicata vaginiformia, superne in laminas ensiformes producta ; lamina usque 28 cm. longa et 30 mm. lata, basi obliqua, apice acuta, per medium pseudo-costa instructa. *Inflorescentia* 4–6 flora, 2–3 cm. longa, haud secunda, fractiflexa ; bractea exterior ovata, subacuta, plus minusve apiculata, circiter 4 mm. longa, ovarium arcte attingens ; bractea interior exteriori similis sed paulam minor. *Perianthium* intense aurantiacum ; tubus curvatus, anguste cylindricus, circiter 10 mm. longus, superne sensim ampliatus ; lobi tres exteriores valde recurvati, oblongo-oblanceolati, 11 mm. longi, 4 mm. lati, apice obtusi ; lobi tres interiores patentes, oblongo-oblanceolati, 14 mm. longi, 4·5 mm. lati, apice obtusi. *Stamina* supra medio tubi affixa, cum stylum eminentia ; filamenta 15 mm. longa ; antherae 3·5 mm. longae. *Ovarium* sub-cylindricum, circiter 4 mm. longum, loculis plus minusve 8-ovulatis ; stylus 27 mm. longus, rami 3 mm. longi apice integri vel bifidi. *Capsula* vix matura obscure triloba, circiter 10 mm. alta et 8 mm. diametro, loculis abortu 2-spermis.

Northern Rhodesia. Mwinilunga District. By R. Kaoomba NE. of Matonchi Farm, at edge of evergreen vegetation in leafy soil and partial shade, 22 Dec. 1937, *Milne-Redhead* 3783 (type) :—Stoloniferous shoots appearing singly, leaves distichous, folded and fused with a false midrib ; rhachis and bracts green tinged orange ; perianth bright orange ; tube curved downwards ; lobes spreading somewhat reflexed ; filaments white ; anthers orange ; style yellow, pointing downwards ; stigmas orange.

Angola. Moxico District. Evergreen vegetation by R. Kampashi, 19 Jan. 1938, *Milne-Redhead* 4228 :—leaves green ; perianth bright orange ; filaments whitish ; anthers and style orange.

The discovery of a second species of *Crocosmia* in Tropical Africa is of particular interest as *C. pauciflora* is from a region many miles west of the area where the widely spread *C. aurea* Planch. is known to occur. Whilst this latter species extends in easterm Africa from the Usambara Mts. in Tanganyika through Nyasaland, Mozambique, Southern Rhodesia, and the Transvaal to Natal, *C. pauciflora* is known from two localities some 40 Km. apart near the headwaters of the R. Zambezi.

C. pauciflora is readily distinguished from *C. aurea* by the characters given in the diagnosis above. The measurements of the flowers in the accompanying description are taken from specimens preserved in spirit solution.

Urginea glaucescens *Engl. et Krause* [Liliaceae] in Engl., Bot. Jahrb. **45,** 146 (1910).

Ornithogalum ndellense A. Chev., Etud. Fl. Afr. Centr. Fr. 1, 322 (1913), nomen nudum.

[*Albuca narcissifolia* (non A. Chev.) —A. Chev. Expl. Bot. Afr. Occ. Fr. **1**, 654 (1920), non A. Chev. in Bull. Soc. Bot. Fr., mém. **8**, 92 (1907)].

Urginea narcissifolia (A. Chev.) Hutch. in Hutch. et Dalz., Fl. W. Trop. Afr. **2,** 348 (1936), pro parte, quoad spec. haud nom.

Anthericum articulatum Hutch. in Hutch. et Dalz., Fl. W. Trop. Afr. **2,** 341 (1936), pro parte, quoad spec. ex Jira, nomen rejiciendum, tantum diagn. angl.

Herba bulbosa. *Bulbus* usque 4 cm. diametro, ovoideus collo circiter 2 cm. longo instructus. *Folia* circiter 6, per anthesin immatura, oblonga, superne angustata, usque 1·3 cm. lata et 20 cm. longa, apice acuta interdum cucullata, margine laevis, utrinque glabra, haud ciliata. *Scapus* 1, simplex, in toto usque 85 cm. longus, infra racemum nudus, circiter 4 mm. diametro. *Racemus* elongatus, usque 28 cm. longus, multiflorus. *Pedicelli* 3–6 mm. longi, apice articulati. *Bracteae* anguste deltoideae, apice attenuatae usque 4 mm. longae, inferne concavae, haud basin in calcar productae. *Perianthii* segmenta campanulato-conniventia vel sub anthesi patentia, subaequalia, oblongo-oblanceolata, 8 mm. longa et 35 mm. lata, apice obtusa, leviter concava, 3 nervia, albida medio viridia. *Filamenta* anguste deltoidea, superne angustata, circiter 5 mm. longa, basi 1·2 mm., apice 0·2 mm. diametro ; antherae 2·5 mm. longae. *Ovarium* 3·5 mm. longum, 2·5 mm. diametro, obscure 3-lobatum; stylus 3 mm. longus, apice haud incrassatus ; ovula in loculis circiter 10. *Capsula* valde 3-lobata, apice emarginata, 10 mm. longa, 15 mm. diametro; lobi ovoidei, transverse nervosi, circiter 7 mm. lati, pedicelli sub fructu usque 12 mm. longi, rigidi. *Semina* discoidea, horizontaliter superposita, ovato-rotundata, usque 7 mm. longa, 5 mm. lata et 1 mm. crassa.

Gold Coast. Aburi, *Anderson* 18 :—bulbous plant ; flowers white. Achimota, in grass savannah on the Accra Plains, 1928, *Irvine* 1005 :—a bulbous herb with cream coloured flowers with green stripes. Achimota, in moist grassland, 7 Apr. 1941, *Milne-Redhead* 5053 :—plants mainly in fruit ; leaves immature, linear, 1·5 cm. broad, narrowed to an acute cucullate apex ; margin smooth and glabrous ; perianth segments white with green central area ; filaments and style white ; ovary green ; capsule brown ; seeds black. Labadi, in grassland on sandy soil, April 1935, *Irvine* 2651 : bulbous plant with dark green leaves and flower stalks over 45 cm. long ; flowers white with broad green stripes.

Dahomey. The Lama (Circle of Allada) between Haevetgi and Massi, 1 Mar. 1910, *Chevalier* 23261 (Paris Herb.). Between Savalou and Gouka, 22 May 1910, *Chevalier* 23720 (Paris Herb.).

NIGERIA. Adamawa Province. Abinsi, 13 Apr. 1912, *Dalziel* 856 :—flowering at beginning of the rains. Yola Province. Yola, in bush near marshes, 9 July, 1909, *Dalziel* 234. Kano Province. Katagum District, *Dalziel* 233, 236. Plateau Province. Jira, in wet places, 2 May 1921, *Lely* 127:—plant 0·9 m. high; flowers white with green middle line on petal. Alizaga, N. of Lafia, on clay, 360 m., Apr. 1936, *Hepburn* 132 :—flowers white. Zaria Province. Anara Forest Reserve, Kan Gimi, in open grassy vegetation by small stream in rocky area, 9 May 1948, *R. W. J. Keay* in *F. H. I.* 22930 :—geophyte with fleshy bulb about 6 cm. in diameter; scape 1 m. high; flowers white.

FRENCH CAMEROONS. Garua, in a dried-up iron-bed, 320 m., April 1909, *Ledermann* 3387 (type).

UBANGI-SHARI. Ndele, 20–25 Apr. 1903, *Chevalier* 8177.

Confusion regarding this plant had in the first place been caused by Chevalier misidentifying two gatherings from Dahomey with *Albuca narcissifolia* A. Chev. a name which he had earlier applied to a plant from Ubangi-Shari, examination of which now shows it to be conspecific with *Ornithogalum eckloni* Schltr., a species widely spread in southern and eastern Africa, reaching its north-western limit in the eastern Sudan.

Hutchinson apparently did not see the type specimen of *Albuca narcissifolia*, and, having been misled by the wrongly named specimens from Dahomey, placed a number of the above cited Nigerian specimens correctly under *Urginea*, but he used Chevalier's misapplied epithet.

At the same time Hutchinson caused further confusion by giving a new name, *Anthericum articulatum* Hutch., to two rather poor specimens collected in Nigeria by Lely, one of which is undoubtedly conspecific with the plants which he placed under *Urginea narcissifolia*, and the other is an *Anthericum* closely allied to, if not identical with, *A. nubicum* Bak. The name *Anthericum articulatum* Hutch., which was published without a Latin diagnoses in 1936, has to be rejected under Art. 38 of the International Rules of Botanical Nomenclature as not having been validly published.

It seemed therefore that a new name was required for this plant, and with this in view the above description was prepared. I then, whilst investigating the affinities of this *Urginea*, came across the descriptions of three species of *Urginea* based on specimens collected by Ledermann in the north of the Cameroons at a place called Garua, which is on the River Benue, 55 Km. beyond the present Nigerian boundary and only 100 Km. from Yola, when our plant is known to occur. These three species appear to have been overlooked by Hutchinson in spite of their occurrence in close proximity to the area covered by the Flora of West Tropical Africa.

I have compared their descriptions closely with that which I had prepared from material at Kew and find that that of *Urginea glaucescens* Engl. et Krause agrees with it remarkably well. It is to be regretted that the type specimen of *Urginea glaucescens* is not at present available for examination. The agreement of the Nigerian material with the description of *U. glaucescens* is so satisfactory however that I have little doubt in placing the above cited specimens under that specific name. The above description of the flowers and fruits is taken from specimens preserved in liquid, which accounts for the slightly larger measurements in comparison with the original description.

E. MILNE-REDHEAD.

Paepalanthus lamarckii *Kunth* [Eriocaulaceae], Enum. Pl. **3,** 506 (1841) ; H. Lecomte in Bull. Soc. Bot. Fr. **55,** 595 (1909).

Eriocaulon fasciculatum Lam., Encycl. **3,** 276, t. 50. f. 3 (1789), non Rottb. (1778).

Paepalanthus ottonis Klotzsch in Schomb., Reise in Br. Guiana **3,** 1115 (1848).

Eriocaulon lamarckii (Kunth) Steud., Syn. Pl. Cyp. **2,** 276 (1855).

Lasiolepsis pilosa Boeck. in Flora **56,** 91 (1873).

Dupatya lamarckii (Kunth) Kuntze, Rev. Gen. **2,** 746 (1891).

French Guinea. Grandes Chutes, at Km. 107 on the railway, 20 Dec. 1908, *Chevalier* 20307.

Sierra Leone. Moyamba District. Newton, near a roadside ditch, in a moist sandy place, Nov. 1928, *Deighton* 1440. Bomatok, 19 Oct. 1945, *P. Adames* in *Deighton* 4128. Bonthe District. Taigbe, locally abundant in the rest house compound on poor sandy soil bare of other vegetation, 15 Oct. 1946, *P. Adames* 90.

Liberia. Dupont, on sandy soil, 15 Nov. 1926, *Bequaert* in *Linder* 1451: —plant 2–7 cm. high.

Gaboon. Akosso, Cape Lopez, on moist sand near the sea, Mar. 1894, *Lecomte* F30. (fide Lecomte l.c.).

Tanganyika. Mafia Island, Kilindoni, where wet-season lagoons are now drying up, forming an association with *Utricularia* spp. *Polygala* spp. and rushes, 6 Aug. 1936, *Fitzgerald* 5213/2.

Since this well known American species was recorded from Gaboon by Lecomte in 1909 (l.c.) it has been found in four further territories in Africa. Whilst it is possible that the species has been introduced into Tropical Africa, it is, on the other hand, quite reasonable to suppose that it is a native. It is hoped that, when collectors pay more attention to the members of this interesting if insignificant family, the distribution of *P. lamarckii* in Africa may be shown to be a natural one. The known occurrences of the species to date are listed above.

The remarkable structure of the calyx of the female flowers and the resulting method of dispersal of the seeds is described by Lecomte (Journ. de Bot. sér. 2, **1,** 136 : 1908). The detached calyces, after the dispersal of the fruits, are quite conspicuous clinging to the heads of all the specimens examined.

E. Milne-Redhead.

Eriocaulon adamesii *Meikle*, sp. nov. [Eriocaulaceae] ; *E. echinospermi* C. Wright affinis, sed foliis tenuioribus, capitulsi pallidis, seminibusque glabris, valde differt.

Herba annua, caespitosa. *Caulis* perennis. *Folia* linearia vel subulata, usque 4 cm. longa, basi 1·2·5 mm. lata, glabra, subpellucida, fenestratim 1–3-nervia, apice acutissima. *Pedunculi* 3–20, erecti, glabri, 3–5 costati, usque 9 cm. longi, vaginae pedunculis arte adhaerentes, folia

subaequantes vel eis paullo breviores, glabrae, leviter inflatae, apice oblique fissae. *Capitula* subglobosa, parva 1·5–3 mm. diametro, albida vel pallide grisea, monoica, floribus ♂ paucis centralibus ; bracteae involucrantes late obovatae, circiter 1·8 mm. longae et 0·8 mm. latae, concavae, glabrae, griseo-albidae, apice obtusiusculae et subcucullatae ; breateae flores subtendentes obovatae, circiter 1·5 mm. longae et 0·6 mm. latae, concavae, glabrae, albidae, apice obtusae vel sub-acutae ; receptaculum glabrum vel sparsissime pilosum. *Flores* ♂ :—sepala 2, libera, usque 0·8 mm. longa, anguste lineari-spathulata, hyalina, apice obtusa vel acutiuscula ; petalorum tubus circiter 1·0 mm. longus, apice lobis 1–2 parvis, obtusis, glabris, glanduligeris instructus ; stamina 4, filamentis inaequalibus antheris nigris. *Flores* ♀ subsessiles, basi glabri vel pilis perpaucis obtecti ; sepala 2, libera, circiter 0·8 mm. longa, glabra, albida, profunde cymbiformia, dorso spongiosa, carinata sed vix alata, apice acuta ; petala 1–2, 0·5–1 mm. longa, lineari-lanceolata, glabra, albida, apice obtusa vel subacuta et glandula nigra ornata ; ovarium rotundato-ovoideum, circiter 0·5 mm. longum, brunneo-fuscum, 2-lobatum ; stylus 0·3 mm. longus, rami 2, 0·6 mm. longi. *Semina* 2, ellipsoidea, circiter 0·4 mm. longa, glabra, brunnea, nitida.

Sierra Leone. Bonthe District. Semjehun, in wet sandy soil at the uppermost end of a tidal creek, 1 Dec. 1945, *P. Adames* in *Deighton* 4146. Taigbe, in grassland on poor sandy soil, 15 Oct. 1946, *P. Adames* 91. Bonthe, common in wet ditches, often submerged, 21 Oct. 1946, *P. Adames* 97 (type).

E. adamesii is a very distinct *Eriocaulon*, having closer affinities with the West Indian *E. echinospermum* C. Wright, and its allies, than with any African representatives of the genus. *E. mutatum* N.E. Br. is the only African species with which it could possibly be confused, but this has blackish capitula, and the sepals of the ♀ flowers have broad wing-like keels.

A new botanical periodical.

The firm of Dr. W. Junk at the Haag has launched a new periodical under the title " Vegetatio " with the subtitle " Acta Geobotanica". Fasc. 1 of vol. 1 is dated 1.7.1948 and is issued with Prof. J. Braun-Blanquet of Montpellier as editor. Six fascicles are to make a volume the price of which is 30 fl. Dutch.

The most important papers in the first fascicle are by T. Yen-Tcheng, on the riverain forests of Bas-Languedoc ; by G. Dubois, on recent investigations concerning pollen analysis in post glacial peats and deposits in France ; by D. M. de Vries, on Dutch grasslands ; by J. Braun-Blanquet, as a summary of the progress of geobotany 1938–1946 ; and by S. R. Goday on geographical botany in Spain during 1939–1946.

We wish the publisher and editor every success in this new venture.

Edible Nuts*—Nuts have been the food of man from the earliest times and with the present world shortage of edible fats and protein for human or animal food they are of special interest. Nuts are in general rich sources of oil or fat and of protein. It is fitting, therefore, that a book devoted entirely to the edible nuts of the world should now appear. It is the work of a member of the Kew staff.

Many consider the shortage of edible fats will only be satisfactorily remedied by the development of the tropical belt, the potential productivity of which is so enormous, assuming that problems such as disease, soil erosion, etc., can be satisfactorily overcome. Such developments would not only provide fat for human use but also large quantities of animal feeding stuffs and therefore directly effect an increase in the production of bacon, meat, poultry, milk, butter and cheese, as has already been envisaged in the East African groundnut scheme.

Little has so far been done in regard to the cultivation and large scale production of most of the tropical nuts which are for the most part the fruits of trees. The establishment of nut plantations in suitable areas of the tropics as a long term project would be in harmony with present day ideals of agriculture, which aim at using the soil to the best advantage and at the same time conserving it.

This is particularly important in the tropics where the heavy rainfall in many areas erodes the soil at an alarming rate if the vegetable cover is removed. A tree crop, on the other hand, holds the soil, adds humus to it, prevents run off and conserves moisture.

The book is composed of two main sections—" Nuts from the Tropics" and " Nuts from Temperate or Subtemperate Regions". The former includes the Brazil nut, Sapucaia nut (*Lecythis*), Swarri nut (*Caryocar*), Cashew nut, Macadamia nut, Java almond and Pili nut (*Canarium*), and Oyster nut (*Telfairia*). There is also information on the Coconut and Peanut. Among the " Nuts from Temperate or Subtemperate Regions " are—The Pistachio, Almonds, Walnuts, Chestnuts, Barcelona nuts, Pecans, American Hickories, Pignolias or Pine Kernels and Edible Acorns.

There are also chapters or sections on " Nuts as Human Food", " The Processing and Storage of Nuts", " Nuts in Britain", " Nut Recipes", and " Miscellaneous and Little Known Nuts". About eighty different species are dealt with under the last mentioned heading. The book is illustrated with photographs representing some 50 different nuts. A bibliography and index are included.

This volume, well printed and illustrated, will be a welcome and authoritative addition to the literature of economic botany.

*Nuts, their Production and Everyday Uses. By F. N. Howes, D.Sc., Faber & Faber, 1948, pp. 264. Price 18s. 0d.

NOTE SUR QUELQUES ORCHIDEES RECOLTEES DANS LES MONTS LOMA (SIERRA-LEONE) ET LES CONTREES LIMITROPHES.

P. Jaeger & V. S. Summerhayes.

Les Monts Loma constituent un vieux massif granitique d'environ trente kilomètres de long sur dix kilomètres de largeur maxima, à orientation S.S.W.–N.N.E. Ces montagnes, situées dans la région N.E. du territoire britannique du Sierra-Leone, sont comprises entre les branches du V que forme le cours supérieur de la Bagbé par 9°00′ et 9°17′ Lat. N. et 11° 12′ et 11°02′ de Long. W. Greenw.

Le massif surgit brusquement au-dessus d'un pays mollement vallonné de faible altitude (Kruto 356 m., Boumboukoro 495 m.) pour atteindre d'emblée des sommets avoisinant de 2000 m. ; il fait partie intégrante de cette ligne de hauts reliefs, la dorsale Loma-Man, qui s'étire à environ 250 km. à l'intérieur des terres, en direction N.W.–S.E., depuis son point d'articulation avec le Fouta-Djallon jusqu'aux hauteurs de Droupole (1340 m.) au S.W. de Man en Côte-d'Ivoire.

Le massif des Monts Loma se subdivise aisément en trois secteurs ou blocs montagneux à altitude décroissante du Nord au Sud :

(a)—un *bloc septentrional* particulièrement puissant culmine au Pic Bintumane (1947 m.) (1), montagne d'allure pyramidale à sommet tabulaire (coulée doléritique) qui constitue par le fait même le point le plus élevé de la portion de l'Afrique Occidentale située à l'Ouest du 8° Long. E. Greenw.

(b)—un *bloc central*, très tourmenté, comporte de nombreux hauts sommets, tel le Sérélen-Konko (1652 m.) en forme de pain de sucre ; le Fuen-Koli (1378 m.) caractérisé par son imposante falaise ; le Da-Oulen (1570 m.), le Sarabaldou (1417 m.). . . .

(c)—enfin, partiellement séparé de l'ensemble par la vallée du Wuliko, un *appendice mériodional* qui atteint au Péran-Konko son altitude maxima (1055 m.).

Le réseau hydrographique est formé d'un essaim de torrents dévalant les pentes toujours raides ; souvent leur cours est interrompu par des cascades : telles les chutes du Denkali sur le versant Nord, celles de Nama Dji sur le versant occidental en face du village de Sini-Koro. En altitude le climat est caractérisé, au moins pendant la saison des pluies, par une température relativement basse et une forte humidité atmosphérique. Pendant des journées entières les hauts sommets peuvent rester enveloppés dans d'épais amas nuageux (3, 4).

Sur les basses pentes des Monts Loma et jusqu'à une altitude dépassant parfois mille mètres s'étale une ceinture forestière compacte. Au-delà débute le domaine de la savane d'altitude, véritable mer de graminées s'étendant à perte de vue jusqu'au plus haut des sommets, interrompue seulement au niveau des ravins et des vallons par des digitations arborées, les galeries forestières, qui, généralement, se relient vers le bas au corps même de la forêt.

(1) Cette altitude, ainsi qui toutes celles citées dans le texte, sont calculées d'apres les données fournies par la carte britannique du Sierra-Leone Survey, scale 1/62500.

A deux reprises, en octobre-novembre 1944 et en août-septembre 1945, l'un de nous, en tant que chargé de mission de l'Institut Français d'Afrique Noire de Dakar, a eu l'occasion d'explorer la végétation des Monts Loma. Nous donnons ci-après quelques résultats concernant la répartition et la biologie des Orchidées récoltées dans ce massif et dans les contrées limitrophes.

La forêt se présente comme une mosaïque d'îlots primaires, du type " deciduous forest", jalonnant principalement les cours d'eaux (*Piptadenia africana*, *Parkia bicolor*, *Amphimas pterocarpoides* . . .), et de lambeaux de formations secondaires (*Harungana madagascariensis*, *Mussaenda erythrophylla*, *Albizzia gummifera*, *Terminalia superba* . . .) succédent aux défrichements. Le versant occidental qui reçoit la mousson de plein fouet abrite une forêt particulièrement dense et luxuriante.

Sur la rive droite du Denkali, à quelques pas en amont des chutes, entre 700 et 800 m., on remarque *Ancistrochilus rothschildianus*, Orchidée épiphyte aux fleurs roses du plus bel aspect (octobre). Sur les dalles rocheuses de la rive, entre les Mousses et les Sélaginelles, *Habenaria leonensis* aux fleurs blanches éperounées ; la plupart sont déjà en voie de fructification (fin octobre). Vers la même altitude mais dans le lit du torrent, des colonies de *Disperis* sp., plantes terrestres, dressées, de 10 à 20 cm. de haut ; l'appareil végétatif est diaphane, les feuilles au nombre de deux sont opposées et de taille inégale ; en octobre, la floraison étant révolue, les plantes ne portent plus que des capsules en déhiscence.

La forêt d'allure primaire qui s'étale au pied du versant occidental des Monts Loma depuis la région de Kruto jusqu'au delà de Sini-Koro, est caractérisée par la richesse et la variété de sa végétation épiphyte ; aux Lichens, Mousses, Lycopodes, Fougères (7) et Pipéracées s'ajoutent des Orchidées telles que *Angraecum distichum*, *Habenaria procera*, *Diaphananthe pellucida* . . . Cette dernière frappe par ses fleurs translucides d'un blanc gras particulier, groupées en inflorescences pendantes. Dans les forêts secondaires de la région du Da-Oulen, le *Disperis thomensis* est abondamment fleuri vers la fin du mois d'août ; il orne le gazon de ses petites fleurs blanches. Cette espèce se recontre aussi en épiphyte sur le tronc des arbres ou sur les blocs rocheux épars à travers la forêt où elle s'associe à des Mousses, à des Fougères (*Asplenium dregeanum*, *A. formosum* . . .). La plante est caractérisée par une paire de feuilles opposées, pigmentées de rouge à la face inférieure. Dans ces mêmes régions on remarque *Bolusiella talbotii* (fleuri en septembre) en épiphyte sur le tronc des buissons et des petits arbres comme *Allophylus africanus* . . .

La forêt montagnarde comprend les galeries forestières et les lambeaux arborés accrochés aux flancs des versants jusqu'à une altitude de 1800 ou de 1900 m., témoins les flots forestiers reliques de la face N.E. du Bintumane (4). Une grande partie de l'année durant, ces formations sont plongées dans une épaisse nappe de brouillard. Les Orchidées s'implantent sur les rameaux et y vivent en association avec les Lichens, les Mousses, les Lycopodes, les Fougères . . . Tel est le cas du *Bulbophyllum cochleatum* trouvé fleuri en octobre sur *Parinari excelsa* entre 1500 et 1600 m., du *Bulbophyllum* sp., du *Tridactyle* sp., du *Rangaeris brachyceras*, *R. muscicola* épiphytes sur *Eugenia pobeguinii* vers 1900 m. ; tel est encore le cas du *Polystachya* ? *laxiflora* trouvé dans une station semblable du versant Sud

du massif du Bintumane. Ces plantes qui vivent en épiphytes à l'extrémité des rameaux souvent désséchés, exposées aux intempéries, sont remarquablement outillées pour vivre dans ces stations éminemment xériques : certaines comme *Bulbophyllum* disposent de pseudo-bulbes ou sont caractérisées par la crassulescence de leur appareil végétatif, d'autres comme *Tridactyle* possèdent de longues racines chargées de chlorophylle à extrémité mucilagineuse.

La savane d'altitude est le domaine des Orchidées terrestres ; au plus fort de l'hivernage, vers la mi-août, elles émaillent le gazon de leurs fleurs blanches, blanc verdâtres, blanc jaunâtres, roses ou rouges. A ce moment de l'année les Graminées sont encore loin d'avoir atteint leur taille définitive ; leurs touffes hautes de 1 mètre ou moins, suivant l'altitude, sont dominées par un *Smithia*, buisson feuillé de 1 m. à 1,70 m. Herbes et buissons confèrent à la savane une physionomie bien particulière en la recouvrant d'un tapis uniforme d'un vert franc, à l'exception des " zônes de lisières " (5) qui prolongent les galeries forestières vers le haut ; là on remarque de vastes taches brunâtres dues, en grande partie, aux frondes sèches du *Pteridium aquilinum* ; par leur teinte elles tranchent sur le vert foncé des galeries forestières et le vert franc de la savane. A cette saison la prairie de montagne est pauvre en espèces herbacées fleuries ; à part le *Trichopteryx reflexa* qui peut couvrir de vastes étendues dès la mi-août, on remarque aux pieds des graminées un *Commelina* à fleurs jaunes, à tiges flasques, couchées et longues souvent de près de 2 mètres, *Thesium tenuissimum*, et sur les basses pentes près de la limite de la forêt *Dissotis pobeguinii*.

C'est dans ces étendues monotones que l'on voit briller les fleurs blanches du *Habenaria jaegeri* ; elles possèdent un labelle trifide aux lobes latéraux profondément divisées ; l'éperon, long de 4 à 5 cm., est souvent entamé à sa base. Cette plante d'un vert-clair et haute de 60 à 80 cm. est loin d'être rare sur la pente N.E. du Pic Bintumane vers 1500 à 1800 m. Vers la mi-août beaucoup de pieds sont déjà en voie de fructification, alors que vers le sommet on en rencontre encore au stade bouton floral. *Eulophia propinqua* se remarque en savane depuis la limite supérieure de la forêt jusque sur les pentes du Bintumane où elle s'associe à l'espèce précédente. Dans les prairies du sommet du Pic le *Disa scutellifera* se détache grâce à ses fleurs d'un rose intense groupées en épis ; vers la mi-août, cette espèce est déjà sur le déclin. Là on remarque aussi le *Satyrium occultum* aux fleurs d'un blanc sale. Le *Polystachya bequaertii*, possède des feuilles pliées en gouttière et disposées en rosette basale d'où émerge une hampe florale grêle haute de quelques centimètres à peine ; ses fleurs roses sont épanouies en novembre ; cette Orchidée a été trouvée blottie dans les Mousses sur la crête du Da-Oulen où la formation à *Dissotis leonensis* règne en maître.

En savane d'altitude, les stations hygrophiles : les dalles et mottes humides, les rochers suintants, la base des pitons en pain de sucre . . . sont affectés par des Orchidées comme *Brachycorythis paucifolia*, *Habenaria chlorotica*, *H.* sp. (§*Bilabrellae*), *H. anaphysema*, *H. malacophylla* . . . ; dans ces milieux le *Habenaria leonensis* se distingue par sa fréquence. Cette Orchidée terrestre, haute de 30 à 40 cm., est caractérisée par ses fleurs blanches et inodores dont l'éperon dépasse 5 cm. de long ; elle se rencontre dans des stations découvertes ou légèrement ombragées entre les

blocs rocheux avec *Nephrolepis cordifolia*, *Hymenodictyon floribundum*, sur les bords rocheux et humides des torrents (Denkali).

Sur les dalles rocheuses, les rebords de falaise et les pitons les plus inaccessibles on remarque les touffes vert-grisâtres de l' *Eriospora pilosa*, édifiant ces tourbières de rocher, spéciales à la région montagneuse de l'ouest africain. Une Orchidée épanouissant ses fleurs jaunes pendant la saison des pluies, le *Polystachya microbambusa* (=*Nienokuea microbambusa* (Kränzl.) Chev.), dont A. Chevalier a récemment spécifié le mode de végétation, croit en épiphyte sur les rhizomes de la Cypéracée (1). Les blocs granitiques épars à travers la prairie donnent asile à une flore xérophytique où les Lichens forment la note dominante ; les Orchidées sont représentées par le *Liparis guineensis* et surtout par les colonies du *Bulbophyllum* aff. *bifarium*. Cette dernière espèce, grâce à la crassulescence de son appareil végétatif est remarquablement adaptée à végéter dans ce milieu d'une sécheresse extrême.

La plupart des Orchidées de savane fleurissent donc au plus fort de la saison des pluies et à ce moment de l'année elles sont à peu près seules à émailler le gazon de leurs inflorescences multicolores. Cependant quelques semaines plus tard, en octobre, le tableau change de fond en comble : les Orchidées terrestres ont disparu ou sont sur le déclin et la strate herbacée, haute de 1 à 2 m. suivant l'altitude, est dominée par les Graminées en fleurs ; les *Smithia* émergent à peine et, sur les hauteurs, le bleu foncé du *Leocus lyratus*, le jaune des *Aspilia* et du *Coreopsis monticola*, le blanc gras des capitules du *Protea angolensis*, le bleu ciel des *Cyanotis* se détachent du tapis graminéen de couleur fauve.

En dehors du massif des Monts Loma, dans les régions limitrophes à basse altitude où règne la savane arborée à *Cussonia djalonensis*, *Lophira alata*, *Daniellia oliveri*, *Pterocarpus erinaceus* . . . les Orchidées terrestres sont loin de jouer le rôle qu'elles détiennent en prairie de montagne. Pendant la saison des pluies on peut remarquer en savane guinéenne : *Habenaria zambesina* (entre Masadou et Camarou) aux fleurs blanches longuement éperonnées, *Eulophia guineensis* (environs de Perankoro). Dans une galerie forestière de la région de Kimadougou, on a trouvé fleuries : *Eulophia longifolia* et *Habenaria engleriana* ; cette dernière, haute de 80 cm. environ, aux fleur blanches et inodores, est une des espèces les plus remarquables du genre *Habenaria* par la longueur de l'éperon : 16 à 18 cm. Aux environs de Boumboukoro, également dans une galerie forestière : *Cyrtorchis* sp., aux fleurs odorantes, blanches ou jaunes suivant le stade de l'anthèse (fin octobre), végétant sur les contreforts d'un *Ceiba thonningii*. En fait d'épiphytes nous signalons *Polystachya puberula*, *P. paniculata* rencontrés sur Néré dans la région de Kruto et de Kékédou ; *Tridactyle tridentata* dans la pépinière de Kissidougou.

Index Bibliographique.

(1)—Chevalier (A.).—Le genre *Nienokuea* Chev. L'assoc. symbiotique entre une Cypéracée et une Orchidée, spéciale aux tourbières de rochers de l'Ouest Africain.—C. R. Ac. Sc.—T. 220—1945, p. 633.

(2)—Engler (A.).—Die Pflanzenwelt Afrikas.—II Band pp. 403 á 448—1908—Engelmann, Leipzig.

(3)—Jaeger (P.).—Note préliminaire sur ma première exploration botanique des Monts Loma. —Congrès C.I.A.O.—I.F.A.N. Dakar, 1945.

(4)—Jaeger (P.).—Sur l'existence dans les Monts Loma de forêts reliques d'altitude.—Congrès A.F.A.S.—Nice, 1946.

(5)—Schnell (R.).—Note préliminaire sur la végétation des Monts Nimba (A.O.F.)—Bull. Soc. Linn. Lyon, 1946, pp. 63 à 66.

(6)—Summerhayes (V.S.).—Orchidaceae in Flora of West Tropical Africa par Hutchinson (J.) et Dalziel (J. M.).—London, 1936.

(7)—Tardieu-blot (Mme.) et Jaeger (P.).—Note sur la répartition de quelques Fougères récoltées dans les Monts Loma (S.L.) et les contrées limitrophes.—Bull. Soc. Bot. France, 1947, pp. 298 à 303.

LISTE DES ORCHIDEES DETERMINEES PROVENANT DES MONTS LOMA ET DES REGIONS LIMITROPHES (1).

Brachycorythis paucifolia *Summerh.*, sp. nov. (2)

Terrestre ; espèce hygrophile, commune. Monts Loma : savane d'altitude, clairières ; VIII ; 975 : Massif du Bintumane, pente N.W. vers 1500 m., dalles rocheuses humides. 1027 : Massif du Bintumane, pente N.E., vers 1600 m., dalles rocheuses humides. 1132 : Massif du Bintumane, pente N.W. 1278 : clairières marécageuses de la région du Da-Oulen. 1327 : Sommet du Da-Oulen 1570 m.

Distrib. : Endemic to the Loma Mts.

This species, which is probably the most interesting discovery made in the Loma Mts., finds its nearest relative in the southern *B. angolensis* (Schltr.) Schltr. It also shows strong resemblances to the anomalous species *B. basifoliata* Summerh. which is known so far only from the island of Principe. This is therefore another example of the curious affinity which is often found between the flora of the western part of " Upper Guinea " and that of the islands of the Gulf of Guinea and of Angola. A further example is *Disperis thomensis* Summerh.

Habenaria leonensis *Kraenzl. ex Dur. et Schinz*

Terrestre ; espèce hygrophile commune en altitude descend le long des cours d'eaux ; Monts Loma ; VIII, IX, X ; 246 : au-dessus des cascades du Denkali vers 800 m. 1279 : Massif du Bintumane, savane d'altitude au Sud du Loma Mansa. 1353 : crête du Da-Oulen. 1393 : Clairière humide dans le Massif du Fuen-Koli. 1478 : Ravin d'altitude du Fuen-Koli, versant N., vers 1300 m. 1949 : Bords du Denkali vers 800 m.

Distrib. : French Guinea, Sierra Leone.

Habenaria zambesina, *Rchb. f.*

Terrestre ; savane entre Masadou et Camarou (Sierra Leone) ; VIII ; 894 : espèce très répandue en Afrique tropicale.

Distrib. : Tropical Africa, except Tanganyika Territory and most of Kenya Colony.

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(1)—Chiffre romain : mois de l'année au cours duquel l'espèce a été trouvée en fleurs. Chiffre arabe : numéro de l'échantillon d'herbier.

(2) This and the other new species in this list were described in Kew Bulletin, 1947, 123—132 (1948).

Habenaria engleriana *Kraenzl.*
Terrestre ; VIII ; 933 : galerie forestière près Kimadougou au pied du versant N. des Monts Loma.
Distrib. : Sierra Leone and Gold Coast.
This remarkable member of sect. *Plantagineae* was previously known only from the Gold Coast.

Habenaria procera *Lindl.*
Epiphyte ; IX ; 1816 : forêt de Sini-Koro.
Distrib. : French Guinea to British Cameroons, Gabon, Principe.

Habenaria anaphysema *Rchb. f.*
Terrestre ; IX ; 1552 : base d'une coupole rocheuse dans le Massif du Sérélen-Konko.
Distrib. : Senegal to Oubangui-Chari, Belgian Congo & Angola.

Habenaria aff. **anaphysema** *Rchb. f.*
Terrestre ; 1663 : massif du Sérélen-Konko.

Habenaria (§**Bilabrellae**).
Terrestre ; IX ; 1984 : dalles et mottes humides, face N.E. du Bintumane entre 1500 et 1600 m.

Habenaria chlorotica *Rchb. f.*
Terrestre ; XI ; 578 : dalles humides de la savane d'altitude au S. du Loma Mansa.
Distrib. : Sierra Leone ; Northern Nigeria ; Uganda and Kenya Colony southwards to Transvaal and Natal.

Habenaria malacophylla *Rchb. f.*
Terrestre ; IX ; 1424 : base d'un piton rocheux du Fuen-Koli.
Distrib. : Sierra Leone ; Nigeria, eastwards to Kenya Colony and Abyssinia, southwards to eastern Cape Province.
H. chlorotica and *H. malacophylla* are both examples of species with wide distribution in Tropical Africa which had previously not been recorded to the west of Nigeria. The present collection is especially interesting for the numerous extensions in range of the species collected.

Habenaria jaegeri *Summerh.*, sp. nov.
Terrestre ; VIII ; 976 : commun en savane d'altitude sur la pente N.E. du Bintumane.
Distrib. : Endemic to the Loma Mts.
The discovery of a member of the striking section *Multipartitae* of *Habenaria* in Sierra Leone extends the range of the section westwards from Nigeria, where the allied *H. mannii* Hook. f. occurs. Eastwards the section occurs through East Africa, India and Western China to the Malay Islands. Twelve species of the section are now known from Tropical Africa, most of them being natives of the highlands of East Africa, especially Abyssinia and Kenya Colony.

Disa scutellifera *A. Rich.*
Terrestre ; VIII ; 1042 : savane du sommet du Pic Bintumane.
Distrib. : Sierra Leone ; British Cameroons ; Abyssinia.

Satyrium occultum *Rolfe.*
Terrestre ; VIII ; 1049 : savane du sommet du Pic Bintumane.
Distrib. : Sierra Leone ; S. Nigeria, eastwards to Uganda, southwards to S. Rhodesia.
Here are two more examples of species previously not known farther west than Nigeria. The distribution given for *S. occultum* is from records which in our opinion undoubtedly belong to this species, but it is possible that the species is conspecific with the South African *S. atherstonei* Rchb. f. or even with the Madagascar *S. trinerve* Lindl.

Disperis thomensis *Summerh.*
Terrestre ou epiphyte ; VIII ; 1289 : forêt secondaire dans la région du Da-Oulen.
Distrib. : French Guinea, Sierra Leone ; São Tomé ; Angola.
This species has recently been found by Mr. E. Milne-Redhead on the Sugar Loaf Mt. near Freetown in Sierra Leone and also in the extreme east of Angola near the Rhodesian border. It is clearly another example of the interesting plant-geographical relationship indicated under *Brachycorythis paucifolia.*

Liparis guineensis *Lindl.*
Terrestre ; VIII ; 1344 : Sommet du Da-Oulen (1570 m.) à la base du rocher granitique.
Distrib. : Sierra Leone to Oubangui-Chari ; N. Rhodesia ; Tanganyika Territory.

Polystachya microbambusa *Kraenzl.*
Epiphyte ; VIII, XI ; commun. 977 : avec *Eriospora pilosa*, pente N.E. du Pic Bintumane. 1046 : avec *Eriospora pilosa* sur dalles doléritiques du sommet du Pic Bintumane. 1676 : avec *Eriospora pilosa*, falaise du Kukunia vers 1300 m.
Distrib. : French Guinea, Sierra Leone, Ivory Coast.

Polystachya paniculata (*Sw.*) *Rolfe*
Epiphyte ; X ; 2162 : sur Néré entre Kékédou et Kissidougou.
Distrib. : French Guinea to Cameroons, Gabon, Belgian Congo and Uganda.

Polystachya? **laxiflora** *Lindl.*
Epiphyte ; en fruits au mois d'août ; 1253 : galerie forestière d'altitude du massif du Bintumane.
Distrib. : French Guinea to Gabon ; Uganda.

Polystachya puberula *Lindl.*
Epiphyte ; 1778 : sur Néré près Kruto.
Distrib. : French Guinea, Sierra Leone, Liberia.

Polystachya bequaertii *Summerh.*, sp. nov.
Terrestre ; XI ; 660 : Da-Oulen autour de 1500 m.
Distrib. : Sierra Leone, Liberia.
The occurrence of a species of sect. *Dendrobianthe* in West Africa is of especial interest since all the other species are natives of eastern or southern Tropical Africa. *P. bequaertii* is also interesting because it is in many respects intermediate between the above section and sect. *Isochiloideae*, also entirely East African in distribution.

Ancistrochilus rothschildianus *O'Brien*
Epiphyte ; X ; 271 : forêts du Denkali vers 800 m.
Distrib. : Sierra Leone ; Nigeria ; Uganda.

Bulbophyllum cochleatum *Lindl.*
Epiphyte ; X ; 294 : galerie forestière d'altitude entre 1500 et 1600 m., massif du Bintumane.
Distrib. : French Guinea, Sierra Leone ; Fernando Po, Nigeria, Cameroons ; Uganda, Kenya Colony ; N. Rhodesia.

Bulbophyllum aff. **bifarium** *Hook.f.*
Xérophyte ; XI ; 568 : sur bloc granitique, savane d'altitude au S. du Pic Bintumane.
This may represent a new species but there are no flowers.

Bulbophyllum sp.
Epiphyte ; 1191 : sur *Eugenia pobeguinii* ravin d'altitude du Bintumane vers 1900 m.

Eulophia guineensis *Lindl.*
Terrestre ; IX ; 1749 : au pied du Péran-Konko dans une formation arborée.
Distrib.: From Gambia eastwards to Kenya Colony and Abyssinia, southwards to Angola and Tanganyika Territory.

Eulophia propinqua *Hutch.*
Terrestre ; VIII ; commune ; 971 : savane d'altitude du massif du Bintumane. 989 : même station.
Distrib. : Sierra Leone, Ivory Coast ; Nigeria ; eastern Belgian Congo, Uganda, Kenya Colony.
More detailed examination may prove this to be conspecific with the East African *E. shupangae* Kraenzl.

Eulophia longifolia (*H. B. K.*) *Schltr.*
Terrestre ; X ; 177 : galerie forestière près Kimadougou au pied du versant N. des Monts Loma.
Distrib. : Sierra Leone ; Gold Coast ; Nigeria, eastwards to Sudan and Uganda, southwards to Angola and S. Rhodesia; tropical America.

Rangaeris brachyceras (*Summerh.*) *Summerh.*
Epiphyte ; VIII ; 1178 : relique forestière d'altitude, pentre N.E. du Pic Bintumane.
Distrib. : French Guinea, Sierra Leone ; Belgian Congo, Uganda, Kenya Colony.
Further investigation has shown *R. biglandulosa* Summerh. not to be specifically distinct from the more widespread *R. brachyceras*. I hope to deal with this more fully in a forthcoming article on the genus *Rangaeris*. It will be seen, however, that there is still a large gap between the area occupied by the species in West Africa and the main centre of distribution in the Belgian Congo and East Africa.

Rangaeris muscicola (*Rchb. f.*) *Summerh.*
Epiphyte ; VIII ; 1181 : relique forestière d'altitude, pente N.E. du Pic Bintumane.
Distrib. : From French Guinea eastwards to Kenya Colony and Tanganyika Territory and southwards to Angola and Northern Rhodesia.

Angraecum distichum *Lindl.*
Epiphyte ; 1808 : galerie forestière entre Kruto et Sini-Koro au pied du versant occidental des Monts Loma.
Distrib. : Sierra Leone to Gabon, São Tomé, Principe and Uganda.

Diaphananthe pellucida (*Sw. ex Pers.*) *Schltr.*
Epiphyte ; IX ; 1815 : forêt de Sini-Koro au pied du versant occidental des Monts Loma ; avec végétation épiphylle. 2040 : bords du Kembéri à proximité du village de Sini-Koro ; avec végétation épiphylle.
Distrib. : From French Guinea through West Africa to Belgian Congo, Gabon and Uganda.

Bolusiella talbotii (*Rendle*) *Summerh.*
Epiphyte ; IX ; 1377 : formation secondaire de la région du Da-Oulen.
Distrib. : Sierra Leone to S. Nigeria.

Cyrtorchis sp.
Epiphyte ; X ; 171 : galerie forestière près Boumboukoro.

Tridactyle tridentata (*Harv.*) *Schltr.*
Epiphyte ; fruits en octobre ; 2153 : pépinière de Kissidougou.
Distrib. : Sierra Leone ; French Cameroons, eastwards to Kenya Colony, southwards to Natal.

Tridactyle sp.
Epiphyte ; 1190 : relique forestière d'altitude versant N.E. du Pic Bintumane.

Fontes Historiae Botanicae Rossicae*. In this useful bibliography the author has endeavoured to enumerate all those publications which have some bearing on the history of botany in the U.S.S.R. The work is arranged alphabetically (by authors) in double column, followed by a subject index divided into three sections ; " Section 1—Bibliographies", " Section 2—Biographies", " Section 3—History and Progress of Botany". Russian titles have been transliterated and are accompanied by an English translation, while brief notes following each entry indicate the nature of the work. Four very interesting plates are included depicting the frontispiece of Sobolewski's Flora Petropolitana, Pallas's map of Prince Demidoff's Gardens, a plan of the Imperial Botanic Garden at St. Petersburg in 1898 and another showing a view of the Great Flower Show of the Saint Petersburg Horticultural Society in the Spring of 1860. It is interesting that the frontispiece of Sobolewski's Flora Petropolitana reproduced as plate 53, is reversed as compared with that in the Kew copy of this work.

The appearance of this bibliography will be welcomed by workers on the flora of Soviet Russia who will find the full references to the publications enumerated of much interest and assistance.

H.S.M.

*By Vladimir C. Asmous. Chronica Botanica 11 : no. 2 pp. 87–118 (1947). Price $1·25. Waltham, Mass. : The Chronica Botanica Co. ; London, W.1 : Wm. Dawson & Sons Ltd.

A NOTE ON THE EUPHORBIACEOUS GENUS BOTRYOPHORA

H. K. Airy Shaw.

The genus *Botryophora* was founded by J. D. Hooker (in Hook. fil. *Fl. Brit. Ind.* **5,** 476 : 1888) upon a single gathering (*King' Collector* 7557) from Perak in the Malay Peninsula. Only the male flowers were known, and it is a remarkable fact that, though the plant has since been collected in Burma, Siam, Sumatra and Borneo, as well as again in the Malay Peninsula, the female flowers are still unknown, and the fruit has only been obtained once (North Borneo). From its scattered occurrence over so large an area, it is presumably an ancient type now on the decline. It is hoped that foresters and others will keep a look out for the female plant, in order to complete our knowledge of the species and enable us to place the genus more satisfactorily within the family—though the general affinity with *Blumeodendron* is clear enough. The *Sterculia*-like leaves and elongate pyramidal panicles of (as in *Blumeodendron* spp.) globose red-and-yellow flowers should render the male plant conspicuous at flowering time. The synonymy and known distribution are set out below ; a new combination is required, as the species was first described, from sterile Sumatran material, under *Sterculia.*

Botryophora geniculata (*Miq.*) *Beumée*, in sched., *ex Airy Shaw*, comb. nov.

Sterculia geniculata Miq. *Fl. Ind. Bat., Suppl.*, 164, 400 (1860).

Botryophora kingii Hook. fil. *Fl. Brit. Ind.* **5,** 476 (1888) ; Pax in Engl. et Prantl, *Nat. Pflanzenfam. III*, **5,** 116 (1891) ; Ridley in *Journ. Fed. Mal. States Mus.* **10** (2), 116 (1920), et *Fl. Mal. Penins.* **3,** 282 (1924) ; Lemée, *Dict. descr. & syn. Genres Pl. Phan.* **1,** 635 (1929), et **8b,** 305 (1943) (genus only) ; Pax et Hoffm. in Engl. et Harms, *Nat. Pflanzenfam.* ed. 2, **19c,** 228 (1931) ; Gage in *Journ. As. Soc. Bengal*, **75** (5), 475, 477, 481 (1936) (genus only).

Blumeodendron sp., Merrill, Pl. Elm. Born., in *Univ. Calif. Publ. Bot.* **15,** 157 (1929).

Burma. Mergui Distr. : Ngawun Reserve, 18 Feb. 1927, *Parker* 2636 : " Large shrub ; leaves up to 60 by 20 cm., petioles up to 20 cm. long. Panicles pendulous, flowers reddish-purple".

Siam. Puket Circle : Tapli, 1919, *Kloss* 6812 : " Large tree. Fruit [sic !] crimson".

Kelantan. Bukit Batu Papan, Sungei Lebir, in forest, c. 1500 m., 6 July, 1935, *Henderson* 29573 : " Small tree c. 20 ft."

Perak. Larut, open jungle, sandy soil near the coast, within 30 m. alt., May 1885, *King's Collector* 755 (type of *B. kingii* Hook. fil.) : " A tree 40 to 50 feet high. Stem 8 to 12 in. diam., leaves glossy bright green. Flower round, half yellow half red, waxy, stamens yellow : flower grows in branches [? bunches] mostly on stem and stronger branches".

Sumatra. Priaman, c. 1855 (?), *Diepenhorst* (nom. vern. *pauh-rimbo*) (type of *Sterculia geniculata* Miq.). Sibolangit, 15 March 1924, *Lörzing* 11007.

North Borneo. Near Tawao, on forested stream banks, 1923, *Elmer* 21129 : " A tree, its trunk 30 cm. in diameter, the depressed-globose fruit dull yellow when mature, 5 cm. in diameter." Betotan, logged area, 75 ft. alt., 20 May 1933, *Orolfo* in *B.N.B. For. Dept.* 3248 : " Tree, 45 ft. high, 30 ins. girth. Flower yellow. Hardwood."

NOVITATES BOMBAYENSES.

H. Santapau, S.J.

Pimpinella multiradiata *Santapau*, spec. nov.

Accedit ad *P. monoicam* Dalz., differt tamen majore numero atque inaequali longitudine radiorum primariorum, minore numero radiorum secundariorum, forma atque structura fructuum atque structura foliorum superiorum.

Herba erecta, ad 2 m. alta. Caulis teres, tenuiter striatus, inferne simplex vel fere simplex, superne ramis patentibus, longis instructus, in spatiis internodalibus intus vacuus.

Folia inferiora ternata ; foliola acuminata, e basi cordata vel rotundata vel cuneata, terminale basi regulari, lateralia vero basi distincte inaequali ornata, utraque setoso-dentata vel serrata, lamina sparse hirsuta praesertim in nervis in inferiore pagina laminae ; inferiorum foliorum foliola ad 15 × 10 cm. ; petiolus 10 cm. longus vel longior, planus ; petioluli 2–6 cm. longi.

Folia superiora ternata vel trisecta, segmentis gradatim mutantibus ex late ovatis ad lanceolata atque tandem linearia vel filiformia ; superiorum nullum reducitur ad vaginas.

Umbellae primariae terminales, axillares vel foliis oppositae, graciles ; bractea nulla vel raro 1 ; radii 10–37, ut plurimum ca. 25, tenues, filiformes, distincte inaequales longitudine, 8–38 mm. longi. Umbellae secundariae 7–12 ; bracteolae 1–3, angustae, margine ciliato : pediculi fructiferi 3–10 mm. longi. Petala glabra vel nonnumquam hirtella pilis fere microscopicis in dorso. Flores albi.

Fructus orbicularis, lateraliter aliquantulum compressus, rotundatus in apice, subdidymus, plus minusve levis (ut plurium omnino levis), 1–1·5 mm. longus ; mericarpia litterae D capitali similia ; juga 5, distincta in singulis mericarpiis ; surculi 2-vittati ; stylopodia haud eminentia, unumquodque stylopodium ad oppositi interiorem faciem applanatum.

Habitat in tumulis artificialibus in posteriore parte loci " Khandala Hotel " nuncupati, altit. ca. 600 m., in Khandala ; typus, Santapau 8054, lectus die 25 novembris 1945 et positus in Blatter Herbario, Bombay; isotypus, qui est simul et paratypus, 8053, lectus eodem die ac loco, positus in Herb. Kewensi.

Canscora khandalensis *Santapau*, spec. nov.

Accedit ad *C. pauciflora*m et *C. decurrentem*, a quibus tamen differt praesertim floribus atque capsulis maioribus, atque sepalis fortiter carinatis ; differt etiam tempore florationis, quae in nova hac specie manifeste prius occurrit quam in caeteris *Canscorae* speciebus. Species intermedia videtur Sectionem I inter et Sect. II. Clarkei Gentianacearum in Fl. Brit. Ind.

Herba erecta, tenuis, 10–25 cm. alta ; caulis 4-alatus vel insigniter acuteque quadrangularis ; rami oppositi vel alterni. Folia sessilia vel subsessilia, maxima ea quae medio cauli insident, ad 6 × 2·5 cm., ovata, elliptica vel lanceolata, subacuta vel obtusa, attenuata ad basim, in obscurum petiolum decurrentia ; superiora folia multo minora, acuta vel

subacuta, sessilia. Flores dichotome cymosi ; pediculi quadrangulares, obscure alati, 1·5–10 mm. longi ; bracteae minutae, ovatae, acutae. Calyx haud alatus sed acute quadrangularis, 4-carinatus, 9–10 mm. longus ; calycis dentes 1·5 mm. longi, triangulares, acuti. Corollae pallide roseae, 10–13 mm. longae ; tubus 6–7 mm. longus, laciniae obtusae. Ovarium oblongum ; stigma 2-lobatum, lobis obtusis, recurvis ; stylus 4–4·5 mm. longus. Capsula 7× 3 mm.

Typus, Santapau 5015, lectus in Khandala, Bombay, die 2 octobris 1944, et positus in Blatter Herb., Bombay ; Paratypi, 2663, 2756, 2779, 5044, 4045, 5073, 5423 in Blatter Herb. positi ; paratypi alii, 2880 in Herb. Kwensi, 1969 in Arn. Arbor., U.S.A.

Gymnema khandalense *Santapau*, spec. nov.

Accedit ad *G. sylvestre* R. Br., a quo differt magnitudine totius plantae et singularum fere partium, pubescentia corollae atque inclusione coronae, forma conica styli, pubescentia folliculorum atque numero minore seminum. Accedit etiam ad *G. pergularioides* Wt. & Gard., sed differt caulibus atque ramis robustioribus, foliis latioribus et acuminatis (non vero caudato-acuminatis), pubescentia densiore folliculorum, petiolis longioribus, pedunculis brevioribus.

Arbusta volubilia maxima, etiam altissimas arbores in silvis densis superantia ; caulis in inferiore parte ad 12 cm. crassus, suberosus, fissuris pluribus insignitus ; rami recentiores virides, dense pubescentes, teretes ; vetustiores vero lenticellati, glabri, grisei. Planta abundanter laticifera.

Folia amplissima pro genere ; ad 15 × 11 cm., late ovata, acuta vel acuminata, non vero caudato-acuminata ; nova quidem dense pubescentia in superiore pagina, rufo-pubescentia in inferiore, vetustiora vero glabra vel fere glabra in superiore pagina, plus minusve pubescentia vel rufo-pubescentia in inferiore, exceptis nervis qui pubescentes remanent in utraque foliorum pagina ; foliorum basis rotundata, acuta vel subacuta ; petioli ad 4 cm. longi, dense pubescentes.

Flores cymose pedunculati ; pedunculi breviores petiolis, ad 13 mm. longi, pubescentes, interpetiolares, sed petiolo vicini ; pedicelli ad 8 mm. longi, dense pubescentes, minutis pubescentibusque bracteis suffulti. Flores primo aspectu floribus *G. sylvestris* similes, differunt tamen ut hic notatur. Calyx dense aeque pubescens ac petioli atque pedunculi ; laciniae ad 1–1·5 mm. longae, orbiculares, obtusae, ciliolatae, corollae tubo breviores. Corolla lutea, 4·5–5 mm. diam. ; tubus 1·5 mm. longus, aeque fere longus ac laciniae. Corollae laciniae crassae, deltoideae, acutae, recurvae, pubescentes utraque, densius vero in externa facie, marginibus ciliolatis ; coronae processus 5, adnati corollae tubo atque alternantes cum hujus laciniis, apices vero haud eminentes extra corollae tubum, infra decurrentes, canaliculati atque marginibus ciliolati. Staminum columna surgens ex imo corollae tubo ; antherarum apices obtusi ; pollinia erecta, oblonga, subsessilia ; stylus eminens supra antherarum apices, conicus, bifidus.

Follicula 8–9 cm. longa, 5 mm. diam., gradatim descrescentia usque ad apicem, qui saepe rostro incurvato ornatur ; immatura quidem follicula dense pubescentia, luteo-viridia ; matura vero brunnea, recta

vel aliquantum falcate incurvata. Semina circiter 12 numero, lateraliter complanata, 10–12 mm. longa, 3–4 mm. lata, circumdata ala 0·5 mm. lata; coma sericeum, album vel griseo-album, ad 4 cm. longum.

Typus lectus in loco Khandala in declivis sub " Duke's Nose", altit. approx. 550 m. ; floruit 1 novembris 1944 (Santapau 5434, typus florum), fructus vero ibidem protulit 20 januarii 1945 (Santapau 5797, typus fructuum) ; typus positus in Blatter Herb., Bombay. Isotypi, qui sunt simul et paratypi, positi sunt in Blatter Herb. (5436, 5796, 5798), in Herb. Kewensi (5435, 5797), atque in Arnold Arb., U.S.A. (5437, 5795).

Barleria prattensis *Santapau*, spec. nov.

Proxime accedit ad *B. montanam* Nees, a qua tamen differt bracteolis multo brevioribus, seminibus glabris, minoribus ; accedit etiam ad *B. Gibsoni* Dalz., a qua differt seminibus minoribus, inflorescentia axillari vel brevissime tantum spicata vel racemosa, atque structura foliorum.

Caules atque rami teretes vel plus minusve quadrangulares, glabri vel subglabri, internodalibus spatiis sat longis. Folia 6–12 × 2–5 cm., membranacea, ovata vel elliptica, integra, glabra vel subglabra, minute punctata, raphidibus plurimis irregulariter dispersis in superiore pagina praedita, in utroque apice attenuata, in petiolum decurrentia ; nervis secundariis 5–6 in utroqur latere nervii medii cumque eo angulum 60 grad. efformantibus ornata ; petiolus 0·5–2 cm. longus, saepe tamen obscurus ob decurrentem laminam.

Flores solitarii, axillares, oppositi atque in perbrevem paucifloram spicam vel racemum terminalem aggregati; pedicelli 0–4 mm. longi, bracteola duplici sub medio ornati. Bracteolae lineares vel subulatae, inferiores quidem aliquando subspathulatae, omnes acutae, plus minusve arcuatae, 6–13 mm. longae, raro longiores, pubescentes vel subglabrae, nervio medio conspicuo, marginibus ciliatis, scariosis.

Sepala exteriora foliacea, ad 37 × 20 mm., subaequalia vel manifeste inaequalia, ovata ; sepalum maius acutum vel subacutum, minus vero obtusum vel subobtusum, ut plurimum integrum, raro breviter 2-lobatum ; utrumque sepalum glabrum vel subglabrum, aliquantulum pilosum sub apice. Sepala interiora 10–15 mm. longa, lineari-lanceolata, acutissima, pubescentia vel subglabra. Corolla ad 8·5 cm. longa, glabra; tubo 3–4·5 cm. longo ; laciniis obovatis, obtusis, subaequalibus, vel una suborbiculari, caeteris obovatis, omnibus ad 20 mm. longis. Corolla in Khandala semper roseo-purpurea. Stamina 2, staminodia 2 absque antheris. Capsula brunnea, glabra, usque ad 20 mm. longa, attenuata in apice superiore, 4-seminata in inferiore parte. Semina nigra vel nigrescentia, orbicularia, valde compressa, circiter 4 mm. diam., 0·5 mm. crassa, rarissime paulo crassiora.

Typus, Santapau 1228 et isotypus 1228 B, lecti in Khandala die 25 octobris 1942, et positi in Blatter Herb., Bombay ; paratypi, Santapau 7435, 7436, 3055, et Blatter 28274 in Blatter Herb., Bombay ; paratypi alii, Santapau 1169 (1) in Herb. Kewensi, 1169 (2) in Arnold Arb., U.S.A.

This new species of Barleria is fairly common in Khandala, where it has been obtained in flower and fruit on numerous occasions. The

general structure of the plant places it near *B. montana* Nees, but the seeds are never silky and the bracteoles below the flowers are much smaller and shorter. In the structure of the bracteoles and seeds it approaches nearer *B. Gibsoni* Dalz., but the latter is a much stouter plant, its leaves more coriaceous, its terminal spike or raceme longer, and its seeds considerably larger.

Examination of the material in Kew Herbarium shows that the new species is rather common in other parts of India outside Khandala ; of the specimens in Kew from the Concan, labelled *B. montana* Nees, the majority belong to this new species. So does also a sheet from the Anamallays collected by Beddome, and on which Gamble has attached this remark : " Perhaps the specimen from which Bedd. Ic. t. 257 was drawn. The glabrous seeds prove that it is not *montana* :" both the specimen and the plate of Beddome represent the new species and not *B. montana* Nees. The two right-hand specimens on Wallich 2391 in Kew Herbarium belong also to this new species.

As regards the name of the new species, I wish to commemorate the help received from Dr. C. A. Pratt, Ph.D., of the Imperial College of Science and Technology, London, under whose guidance and supervision much of the work connected with the Flora of Khandala has been carried out during my stay in London in the years 1946–1948.

Achyranthes coynei *Santapau*, spec. nov.

Accedit ad *A. asperam* L., var. *porphyristachyam* Hook. f., a qua tamen differt sequentibus notis : planta perennis ; habitus frutescens atque profuse ramosus ; magnitudine caeteras species Indicas huius generis antecellit ; inflorescentia multo longior, flores et fructus saltem duplo majores quam in specie typica *A. asperae*.

Frutex perennis, erectus, ad 3–3·5 m. altus. Caulis teres, lignosus, ad 5 cm. diam. infra, tenuior supra ; rami ramulique plures, lignosi, patentes, novelli quidem pubescentes, caeteri vero glabri vel glabrescentes ; extensio totius plantae, inflorescentia atque ultimis ramulis inclusis, saepe ad 3·5 m. extenditur. Folia plurima, decidua ; inferiora quidem 23·5 × 9 cm. vel etiam majora ; superiora vero gradatim decrescentia, omnia elliptica vel lanceolata, acuta vel acuminata, glabra vel subglabra supra, pubescentia vel subpubescentia subtus, praesertim ad nervios primarios, qui 10–12 numerantur in utroque latere nervii medii ; margine integra ; basi acuta vel cuneata, decurrentia in petiolum ; petiolus ad 3 cm. longus, pubescens, plus minusve canaliculatus.

Sepala primo viridentia vel pallida, demum straminea colore ; flores vero ad anthesim rosei vel carnei ob colorem tubuli staminalis. Flores primo erecti, deinde patentes, tandem deflexi atque adpressi ad rachidem inflorescentiae. Rachis sat crassa, ad 56 cm. longa, dense pubescens, grisea vel albescens ; spicae patentibus floribus ad 20 mm. diam. Bracteae persistentes, ovatae, acuminatae, membranaceae, ca. 6 mm. longae ; bracteolae aristatae, deciduae, aeque fere longae ac bracteae. Sepala ad 10 mm. longa, 1·5–2·5 mm. lata, glabra, viridia vel viridentia, marginibus scariosis. Stamina 5 ; staminodia fimbriata, rosea, dimidio breviora quam filamenta, aeque fere longa ac capsula. Capsula ca. 5 mm. longa, ornata stylo 6 mm. longo, inclusa persistentibus atque induratis sepalis,

brunnea, truncata in apice ; semina singula in singulis capsulis, leviter brunnea, aeque fere magna ac capsula ipsa, truncata in apice, cylindrica atque levia.

Typus, Santapau 8074, lectus est in Khandala, in montibus "Western Ghauts" in India, die 26 novembris 1945, et positus in Blatter Herb., Bombay; iso- et para-typi positi in Blatter Herb., Bombay (8069, 8070, 8073), in Herb. Kewensi (8071) atque in Herb. Arnold Arb., U.S.A. (8072) ; paratypi (5945, 5946, 5947, 8649 ; Blatter 27553, 27554, 27555) positi in Blatter Herbario.

This species is dedicated to the Rev. A. M. Coyne, Principal, St. Xavier's College, Bombay, with whose unfailing help and support the exploration of Khandala during the years 1940 to 1946 has been made possible.

Impatiens balsamina Linn., var. **corymbosa** *Santapau*, var. nov.

Accedit ad *I. Balsaminam* Linn., var. *roseam* Hook. f., a qua differt inflorescentia corymbosa. Herba annua, post tempus pluviarum florens. Flores paulo minores quam in var. *rosea*, cui tamen similes sunt structura. In nova hac varietate inflorescentia est axillaris, floribus corymboso-racemose dispositis. Pedunculus communis vel racemi rachis producitur usque ad 1·3 cm., floribus 3–5 unicuique pedunculo insitis atque duobus vel pluribus mm. inter se distantibus ; pedicelli variae longitudinis sunt, ita tamen ut flores corymbum fere perfectum efficiant ; singuli pedicelli parvula bracteola ca. 1 mm. longa, acuta, pubescenti fulciuntur.

Typus, Santapau 5459, lectus est in loco Khandala, Bombay, die 2 novembris 1944 et positus in Blatter Herbario, Bombay.

Zizyphus xylopyra *Willd.*, var. **glaberrima** *Santapau* var. nov.

Affinis *Zizypho xylopyrae*, diversa tamen praesertim foliis omnino glabris vel ad nervios tantum primarios leviter pubescentibus.

Arbor parva, erecta, ad 4 m. alta, ut plurimum sparsissime armata, haud raro tamen vel omnino inermis vel aculeis pluribus ornata. Ramuli recentiores pubescentes, maturiores vero glabri. Folia acuta, subacuta, obtusa vel etiam leviter emarginata, 3-nervia ex basi (nerviis haud convergentibus in folii apicem, sed parallelis remanentibus ex medio folio usque ad apicem), acuta vel rotundata ad basim et valde inaequalia, omnino glabra vel ut summum sparse pubescentia ad nervios primarios in inferiore pagina, marginibus irregulariter denticulatis, petiolis ad 6 mm. longis, tomentosis. Stipulae, absentibus aculeis, 2 ad singula folia, filiformes, ad 5 mm. longae, caducae, stipularum vero cicatricibus obviis etiam in plantis in herbario servatis.

Flores ut plurimum 5-meri, pallide virides ; calyx et corolla ut in specie typica. Stamina petalis opposita, viridia vel luteo-viridia, filamenta crassiora, petalis aequilonga, leviter tomentosa ; antherae minutae, 2-cellulatae, bassifixae, longitudinali fissura dehiscentes. Fructus primo viridis, tandem griseo-brunneus vel niger, glaber, ad 21 mm. diam., globosus vel tenuiter ad polos compressus ; pericarpium lignosum vel sublignosum. Semina orbicularia, 8 mm. diam., 2 mm. crassa.

Typus, Santapau 4344, lectus in loco Khandala, Bombay, die 27 maji 1944 ; isotypi, qui sunt simul et paratypi, 4345–4349, positi in Blatter Herb., in Herb. Kewensi, et in Arnold Arb., U.S.A.

This is a very common tree about Khandala on open plateaux ; the typical species is absent from the district.

Cyathocline purpurea (*Don*) *O. Kuntze*, var. **alba** *Santapau*, var. nov.

Similis *C. purpureae*, diversa tamen flosculis omnibus in capitulo uniformiter albis. Folia infima verticillatim disposita atque terrae adpressa, caeteris majora sed cito marcescentia : reliqua folia altius incisa quam in specie typica, incissionibus saepe ad nervum principalem fere pervenientibus ; hac in re nova haec varietas ad *C. Lawii* accedit. Ceterum folia in hac varietate minora, eorumque segmenta angustiora sunt quam etiam in *C. lutea*.

Habitat in oryzetis post messionem, saepe simul cum purpurea specie typica ; frequens est praesertim in oryzetis ad St. Xavier's Villa, Khandala. Typus, Santapau 8094, lectus in Khandala die 26 novembris 1945, et positus in Blatter Herb., Bombay ; paratypus, Santapau 8883, positus in Herb. Kewensi.

Cyathocline purpurea (*Don*) *O. Kuntze*, var. **bicolor** *Santapau*, var. nov.

Similis *C. purpureae*, diversa tamen flosculis in capitulo externis quidem purpureis, internis vero albis. Alabastra purpurea sunt ; post anthesim vero series unica vel duplex externa flosculorum purpurea est, colore " Mathew's Purple " (Ridge 65'), flosculi vero in medio capitulo albi, coloribus purpureo et albo immutatis permanentibus usque ad marcescentiam capituli.

Folia infima verticillatim disposita atque terrae adpressa, sed cito marcescentia; reliqua folia multo minora sunt quam in specie typica ; tota vero planta major est quam *C. lutea*, minor vero quam *C. purpurea*. An varietas haec hybrida est inter utramque speciem, i.e. *C. purpuream* et *C. luteam* ?

Frequens est nova varietas in oryzetis post messionem, saepe simul cum varietate typica atque *C. lutea*, sed his duabus speciebus multo frequentior in oryzetis ad St. Xavier's Villa. Typus, Santapau 3421, lectus in Khandala die 24 decembris 1943, et positus in Blatter Herb., Bombay ; iso- et para-typi, Santapau 3422, 3423, in Herb. Kewensi et in Arn. Arbor., U.S.A.

Carissa congesta *Wight*, var. **albida** *Santapau*, var. nov.

Carissae congestae affinis, diversa tamen tum colore albido fructuum, tum tempore florationis et fructificationis tardiore.

Arbor parva, 4–5 m. alta, erecta, non vere prostrata nec subscandens. Flores uno saltem mense tardiores sunt quam in specie typica ; fructus vero perdurant longe posteaquam fructus *C. congestae* deciderunt. Fructuum color primo viridis, demum pallide virido-cremeus vel albidus, structura vero fere sphaerica vel globosa, ad 20 × 18–19 mm. Semina 4, nonnumquam vero, ut videtur, 3, sed quarti seminis abortivi reliquiae facile dignoscuntur. Sapor fructuum novae varietatis multo suavior quam varietatis typicae.

Tres tantum plantae huius novae varietatis observatae sunt in loco Khandala ; aliis vero in locis prope Khandalam varietas haec absque dubio communior est, cum ejus fructus in publico emporio venumdentur,

atque ob potiorem magnitudinem et sapidiorem qualitatem majus pretium obtineant quam fructus varietatis communis. Floret mensibus februario ad aprilem ; fructus vero profert mensibus maio et junio.

Typus, Santapau 8890, et paratypi, Santapau 4408, 8984, 8985, in Blatter Herb. positi ; paratypi alii, 4407 and 4401, in Herb. Kewensi et Arnold Arb., U.S.A. positi.

Striga gesneroides *Vatke*, var. **minor** *Santapau* var. nov.

Accedit ad *S. gesneroidem* Vatke, a qua differt sequentibus notis : Varietas nova parasita est in radicibus *Hygrophilae Serpyllum* Anders. quam ita afficit ut *Hygrophilae* flores et fructus pauciores vel tardiores sint, raro tamen omnino inhibeantur. Florationis tempore nova varietas attingit 1·8–8·5 cm., portione illa etiam inclusa quae sub terra condita est, ita ut specimina parva vix caput super solum efferant. Flores multo minores sunt quam in specie typica, ut plurimum 2·5–3·5 mm. diam. Bracteolae sub floribus vel omnino glabrae vel tantum sparse et minute ciliolatae. Culmorum ramificatio vel omnino abest vel saltem rara est. Totius plantae color ut plurimum est purpureum, flores vero purpurelli ; haud raro tamen plantae virides floribus albis praeditae inveniuntur ; post exsiccationem vero omnes plantae nigrae vel nigrescentes evadunt.

Typus, Santapau 3072, isotypus 3073 et paratypi 3416, 3417, 3418, 3438, 3451, 5051, 5462 lecti in loco Khandala et positi in Blatter Herb., Bombay ; paratypi alii 3477 et 3545 lecti eodem loco, positi in Herbario Kewensi et in Arnold Arb., U.S.A.

Utricularia reticulata *Smith*, var. **parviflora** *Santapau* var. nov.

Accedit ad *U. reticulatam* Smith, a qua differt scapis, floribus et fructibus dimidio saltem minoribus. Scapus 6–12 cm. longus, filiformis, scandens; bracteae et bracteolae ut in specie typica, sed multo minores ; pedicelli filiformes, ad 9 mm. longi, fructiferi quidem alati in superiore triente ; calyces floriferi 2–2·5 mm. longi, late ovati, sepalo superiore paulo majore quam inferiore, utroque vero acuto ; calycis fructiferi sepala accrescentia ad 6 × 4 mm. Corollae 6–8 mm. latae, labello inferiore bullato, sed structura et colore ut in specie typica. Capsula 3–3·5 mm.

Typus, Santapau 5422, lectus in loco Khandala die 31 octobris 1944, et positus in Blatter Herb., Bombay atque in Herb. Kewensi.

A gregarious, small, scandent herb, growing in association with the typical species, but without intermediate stages between the two. It cannot be said that the general reduction of the plant and all its parts in relation to the typical species is due to soil conditions, as both plants were found growing on the same type of soil and in general exposed to the same climatic conditions. Both plants were abundant in patches, the typical species being the more abundant and conspicuous of the two.

Aeginetia indica *Linn.*, var. **alba** *Santapau*, var. nov.

Accedit ad speciem typicam, sed differt corollis omnino albis, calyce et scapo lutescentibus vel stramineis, atque omnibus partibus aliquantum diminutis.

Herba erecta, annua (?), parva, conspicua praesertim ob colorem florum et scaporum ; scapus et calyx pallide citrini vel flavo-virentes vel

straminei ; corolla uniformiter alba ; stamina et stigma lutea vel cremea. Post exsiccationem tota planta atro-brunea evadit. Magnitudine nova varietas ca. 2/3 speciei typicae est.

Typus, Santapau 2412, lectus in loco Khandala die 21 augusti 1943 et positus in Blatter Herb., Bombay ; paratypi 4812 in Blatter Herb., 4955 in Herb. Kewensi, 4956 in Arnold Arb., U.S.A.

This new variety is rather common in the undergrowth near Khandala Cemetery, a spot from which the typical species is altogether absent ; the white-flowered plants have been recorded from the same spot on several occasions during the years 1944 and 1945.

Pogostemon plectranthoides *Desf.*, var. **glaberrima** *Santapau*, var. nov.

Proxime accedit ad *P. plectranthoidem*, a quo tamen differt inflorescentia omnino glabra ; bracteae, bracteolae atque calycis laciniae omnino glabrae. Typus huius varietatis est Blatter 24055, lectus in loco Khandala mense Aprili, probabiliter anno 1918 et positus in Blatter Herb., Bombay.

There is only one sheet of this variety in Blatter Herb., collected in Khandala in April ; the year of the collection is not mentioned on the sheet, but in all probability it was the year 1918. In all respects the new variety agrees with the typical species except that the whole inflorescence is entirely glabrous.

Primulas in the Garden*—In his preface the author says : " This book is written by an amateur gardener, and is intended as a guide for amateurs ; it deals with the cultivation of Primulas under different conditions, and with the care and management of the Florists' Auricula, based on my own personal experiences over more than a quarter of a century." Mr. Corsar presents his knowledge of Primula cultivation in a clear forthright manner and, in addition, provides a considerable body of accurate information about the plants, without burdening his text with references and quotations. After an opening chapter dealing in general terms with Primulas and their cultivation, the greater part of the book is devoted to the species and hybrids known to be in cultivation, these being grouped under three headings (1) those for the Rock Garden (2) those for the Border, Wild Garden and Waterside, and (3) those for the Alpine House and Scree. In each of these sections the species and hybrids are considered individually in alphabetical sequence—a comprehensive index at the end of the book facilitating reference. The photographs which illustrate the book—many of them provided by Mr. David Wilkie of the Royal Botanic Garden, Edinburgh, whose assistance and advice the author warmly acknowledges—are excellent ; a list of them is provided, but it is a great pity that they are not mentioned in the text nor included in the index. " Primulas in Cultivation " appears to be a careful and reliable piece of work and can be confidently recommended to those interested in the cultivation of the genus.

J.R.S.

*Kenneth C. Corsar, Primulas in the Garden, 143 pp., frontispiece in colour, and 52 photographs. Lindsay Drummond, London, 1948. 12/6.

STUDIES IN THE ERICALES : IX.

The taxonomic position of Wittsteinia.

B. L. Burtt.

Wittsteinia is a rare Australian genus, the sole species, *W. vacciniacea* F. Muell., being known only from the summits of the Baw Baw and Donna Buang Mountains of Victoria. It was first described by Ferdinand von Mueller (1861, 1863, 1864–65) and was placed by him in the family *Vacciniaceae*. In this Bentham and Hooker (1876) agreed, regarding it as an anomalous member of that family. Drude (1897, p. 47), uniting *Vacciniaceae* with *Ericaceae*, placed *Wittsteinia* not in *Vaccinioideae* but in *Arbutoideae*, though there is no closer affinity for it there than in its previous position. The essential features which render *Wittsteinia* an anomalous genus in the *Ericaceae* (incl. *Vacciniaceae*) are the 5 stamens, unappendaged anthers dehiscing by longitudinal slits, and simple pollen. *Wittsteinia*, however, does show a significant resemblance to *Prionotes* and *Lebetanthus*, two rather aberrant genera of *Epacridaceae*, and a more detailed examination, of which the results are given below, justifies its transfer to that family.

Both the genera with which *Wittsteinia* will now be compared are monotypic : *Prionotes cerinthoides* (Labill.) R. Br. is an epiphytic climbing shrub in the mountain forests of Tasmania, while *Lebetanthus myrsinites* (Lam.) Macloskie, a smaller plant having a similar habit, is found in subantarctic South America. *Wittsteinia* on the other hand is a dwarf terrestrial shrub (see Pescott, 1926) and its leaves are much larger than those of *Prionotes* or *Lebetanthus*. The leaves have, however, a similar texture and the same glaucous undersurface which characterises the other two genera.

Prionotes, *Lebetanthus* and *Wittsteinia* agree in having solitary, axillary flowers borne on multibracteolate pedicels. The calyx, as in most of the *Ericales*, is composed of 5 free sepals. The corolla of *Wittsteinia* provides some sort of a link between that of *Lebetanthus*, which is small and campanulate, and the long cylindric corolla of *Prionotes*. It is however very much closer to the former, but is twice as large.

The chief differential characters between *Ericaceae* and *Epacridaceae* are found in the stamens, which are of particular interest in the genera under discussion since they are not typical of either family. The first important point is that in *Wittsteinia*, as in *Prionotes*, *Lebetanthus* and the rest of the *Epacridaceae*, they are only 5 in number. The filaments in all three genera are narrow, flattened and free from the corolla, except that in *Prionotes* the anthers are attached to the corolla between the lobes, the rest of the filament being free*. It is in the structure of the ovary that we find the most marked difference between *Wittsteinia* on the one hand and *Lebetanthus* and *Prionotes* on the other. *Wittsteinia* has an inferior trilocular

*In *Prionotes* the anthers are attached to the corolla between its lobes in early bud, after which filament and corolla-tube evidently elongate together. Sometimes, however, the filament grows longer than the corolla and this may result either in the filament becoming buckled and twisted within the corolla-tube (which happens if the attachment of the anther to the corolla is strong), or the anther breaks away from the corolla and becomes exserted. Thus the fact that the stamens are sometimes considerably exserted, sometimes not at all, does not here indicate the existence of dimorphic flowers.

ovary with rather few ovules arranged in two ranks. *Lebetanthus* and *Prionotes* have superior 5-locular ovaries with more numerous ovules localised on placentae towards the top of the axis. The fruit of *Wittsteinia* is a berry, whereas *Lebetanthus* and *Prionotes* both have septicidal capsules.

Dealing first with the points of agreement which we have found between *Wittsteinia*, *Lebetanthus* and *Prionotes*, the most important are obviously those concerning the stamens. Here we have three genera which agree in having 5 free stamens bearing bilocular anthers dehiscing by slits and producing simple pollen grains. The longitudinal dehiscence of the anthers and the simple pollen are generally accepted characteristics of the family *Epacridaceae*, as opposed to *Ericaceae*. The possession of five stamens is anomalous in *Ericaceae* where 10 stamens are usual, and, though other deviations do occur, only *Notopora* (*Ericaceae—Vaccinioideae—Thibaudieae*) and *Loiseleuria* (*Ericaceae—Rhododendroideae—Phyllodoceae*) agree with the plants under discussion in having 5, and, on other counts, there can be no question of close affinity with these. In *Epacridaceae* the usual number of stamens is five. *Lebetanthus*, *Prionotes* and *Wittsteinia* are anomalous in *Epacridaceae* in having bilocular anthers and stamens free from the corolla*. It was for this reason that Drude (1897, p. 72) proposed a separate tribe, *Prionoteae*, for *Prionotes* and *Lebetanthus* and, as we have seen, *Wittsteinia* agrees with these genera in the important characters on which the tribe was founded.

The main objection to the inclusion of *Wittsteinia* in *Epacridaceae* is its possessing an inferior ovary. This character, however, no longer carries the same weight as it formerly did. In the cycle of affinity with which we are concerned we may mention the frequently accepted union of *Vacciniaceae* with *Ericaceae* and, as a particular case, the inclusion of *Chiogenes hispidula* in the otherwise superior-ovaried genus *Gaultheria* (Shaw, 1941, p. 328). Further afield Hutchinson (1934) has separated *Liliaceae* from *Amaryllidaceae* by criteria of the inflorescence rather than the position of the ovary. The genus *Cyananthus* is rightly placed in *Campanulaceae* despite its inferior ovary, while Shaw (1937) has placed a genus in *Theaceae* which is unique in the family in having a wholly inferior ovary. The change from superior to inferior ovary is, in fact, now generally accepted as a normal evolutionary progression and cannot warrant the separation of *Wittsteinia* from the genera *Prionotes* and *Lebetanthus*, to which on other grounds it is evidently related. It is therefore proposed that *Wittsteinia* shall be placed as a third genus in the tribe *Prionoteae* of *Epacridaceae*.

Phytogeographically the recognition of a third genus of this tribe and the resulting extension of its range to the mainland of Australia, is of great interest, especially as *Wittsteinia* is on the whole more closely allied morphologically to the South American *Lebetanthus* than it is to the Tasmanian *Prionotes*.

I am indebted to Mr. H. K. Airy Shaw for much time spent in discussing the affinities of *Wittsteinia* and for his help in writing up the results.

*One other genus of *Epacridaceae* has been described with free stamens ; this is *Choristemon* (Williamson, 1924). In all other characters, however, *Choristemon* is closely allied to *Needhamia* and there is not the slightest doubt that it is correctly placed in the tribe *Styphelieae*. The general facies, acicular leaves and bearded corolla are quite unlike the genera of *Prionoteae* and, in addition, the ovules are solitary and pendulous in each cell of the ovary.

References.

Bentham, G., and Hooker, J.D. ; 1876. Genera Plantarum, **2,** 577.

Drude, O. ; 1897. Ericaceae in Engler & Prantl, Die natürl. Pflanzenfam., **4,** Abt. 1.

Hutchinson, J. ; 1934. The Families of Flowering Plants, **2,** Monocotyledons.

Mueller, F. von ; 1861. Fragmenta Phytographiae Australiae, **2,** fasc. 15, 136.

— — 1863. Op. cit. **3,** fasc. 23, 166.

— — 1864–65. Plants indigenous to the Colony of Victoria, Lithograms, t. 51.

Pescott, E. ; 1926. Two rare native mountain heaths, in Victorian Naturalist, **42,** 295.

Shaw, H. K. Airy ; 1937. Symplococarpon Hintoni (Bullock) Airy Shaw, in Hooker's Icones Plantarum, t. 3342.

— — 1941. Classification of the Asiatic species of Gaultheria, in Kew Bulletin, 1940.

Williamson, H.B. ; 1924. Description of a New Victorian Plant, in Victorian Naturalist, **40,** 231.

ON FARSETIA HAMILTONII ROYLE.

B. L. Burtt.

Farsetia hamiltonii Royle (*Cruciferae*) has been recorded from several places in the great palaearctic desert region which stretches from the Atlantic shores of the Sahara to the deserts of north-western India, and this is the distribution attributed to it by Blatter (Fl. Arab. 15 : 1919), Jahandiez & Maire (Cat. Pl. Maroc. **2,** 310 : 1932) and others. Such a wide geographical range through a zone of relatively uniform climate is known in many other desert species, for instance *Notoceras bicorne* (Ait.) Caruel (*Cruciferae*) and *Ifloga spicata* (Forsk.) Sch. Bip. (*Compositae*) to give only two examples. In the case of *Farsetia hamiltonii*, however, it does not withstand closer scrutiny : geographical arrangement of the herbarium material shows that it comes from three widely separated areas, and the presence of associated morphological differences leads to the conclusion that the use of the name must be confined to the plant of N.W. India and adjacent territories.

Consequent on this restriction of *F. hamiltonii*, it is necessary to find names for the species from the other two areas, E. Arabia and Morocco. The Arabian plant is *F. linearis* Decne. and that name must be revived, but the Moroccan species has never been described and it is therefore published here as a new species, *F. occidentalis* B. L. Burtt. It may be noted that the areas of distribution of *F. linearis* and *F. occidentalis* are separated by that of *F. longisiliqua* Decne., which occurs in S.W. Arabia and in African territory on the opposite side of the Red Sea. This species is closely allied to *F. hamiltonii* and its allies and it has therefore been included in the following enumeration and in the table, which shows the main differences between the four species.

Farsetia hamiltonii *Royle*, Ill. Bot. Himal. 71 (1834) ; Hook. fil. & T. Anders. in Hook. fil. Fl. Brit. Ind. **1,** 140 (1875)—excl. syn. *F. linearis* Decne. *F. linearis* Decne. sec. Hook. fil. in Hook. Ic. Pl. t. 808 (1852)—non Decne.

Type : India : western bank of the Jumna from Delhi to Agra, *Hamilton* (Wall. Cat. no. 4801).

Distribution. N.W. India, Baluchistan and Afghanistan.

The very small flowers of this species are sufficient to distinguish from all others with comparable fruits.

Farsetia linearis *Decne. ex Boiss.* in Ann. Sci. Nat. Sér. 2, **17,** 150 (1842). *F. hamiltonii* Royle sec. Blatter, Fl. Arab. in Rec. Bot. Surv. India, **8,** 15 (1919), pro parte—non Royle.

Type : Arabia ; Muscat, *Aucher* 4069.

Arabia. New Camp, Bahrein Island ; in sand ; fl. purple–red due to the veins being coloured while the ground colour is pale yellow ; 12 Dec. 1935, *Fernandez* 114.

Although confused with *F. hamiltonii* Royle, *F. linearis* has always been kept distinct from *F. longisiliqua* Decne. This is a course about which I have considerable doubts, but the material available is scarcely adequate to enable the point to be finally settled at present. I therefore keep them separate for the time being, calling attention to the much more twiggy habit of *F. linearis* as a possible point of distinction.

Farsetia longisiliqua *Decne.* in Ann. Sci. Nat. Sér. 2, **4,** 69 (1835); Boiss. Fl. Or. **1,** 159 (1867) ; Blatter, Fl. Arab. in Rec. Bot. Surv. India, **8,** 16 (1919). *F. stylosa* T. Anders. in Journ. Linn. Soc. Bot. **5,** Suppl. 1, p. 1 (1860)—non R. Br. (1826).

Type. Arabia ; dans les champs de l'Yemen, *Bové.*

Distribution. S.W. Arabia and African territory on the Red Sea coast ; Socotra.

The type of this species is in fruit only. Specimens associated with it are not altogether uniform and I do not feel confident at present in deciding which should be used to supply the floral characters. The specimen I have chiefly relied upon is Schweinfurth (Expedition Riebeck) no. 84, but its longest fruits are barely 3 cm. long, compared with nearly 4 cm. on the type specimen.

Farsetia occidentalis *B. L. Burtt*, sp. nov. adhuc cum *F. hamiltonii* Royle et *F. lineari* Decne. confusa, ab illa basi lignosa, ab ambabus floribus majoribus petali lamina angustiore, fructibus maioribus rostro robustiore, seminibus incomplete circumalatis differt. *F. linearis* Decne. sec. Coss. Ill. Fl. Atlant 57, t. 38 (1884)—non Decne. *F. hamiltonii* Royle sec. Jahandiez & Maire, Cat. Pl. Maroc. **2,** 310 (1932)—non Royle.

Herba perennis, basi lignosa, ramis ramulisque virgultis pilis medifixis dense et appresse pubescentibus. *Folia* sparsa, saepe mox caduca, linearia, 1–3 cm. longa et 1–1·5 mm. lata, uti ramuli dense pubescentia. *Flores* laxe racemosi, pedicellis c. 5 mm. longis suffulti. *Sepala* 5–6 mm. longa, oblonga, apice obtusa, leviter hyalino-marginata, dorso dense

	F. hamiltonii Royle	*F. linearis* Decne.	*F. longisiliqua* Decne.	*F. occidentalis* B. L. Burtt
Area	Afghanistan, Baluchistan, Sind, Punjab	E. Arabia	S.W. Arabia and N.E. tropical Africa	Morocco and Algeria
Habit	Herbaceous ; leaves sparse but always present	Woody at base ; twiggy and almost leafless	Woody at base ; leaves few	Woody at base ; leaves few.
Sepals	3 mm. long	5 mm. long	7 mm. long	5–6 mm. long
Petals	5 mm. long ; blade wider than claw	1 cm. long ; blade wider than long slender claw	1 cm. long ; blade scarcely wider than long slender claw	8 mm. long ; blade scarcely wider than claw
Fruit	1–2 cm. long ; beak 1·5–2 mm. long, slender	1·5–2·5 cm. long ; beak 3 mm. long, slender	2·5- 4 cm. long ; beak 3·5 mm. long, slender	2·5–3·5 cm. long ; beak 3·5- 4·5 mm. long, stout
Seed	Completely winged (wing notched at hilum)	Completely winged (wing notched at hilum)	Incompletely winged (wing discontinuous at hilum)	Incompletely winged (wing discontinuous at hilum)

Table to show the distinguishing characters of Farsetia hamiltonii Royle and its close allies.

appresse pubescentia. *Petala* oblonga, obtusa 8 mm. longa et fere 2 mm. lata, lamina venosa ab ungue evenoso vix distincta. *Stamina* longiora 7 mm., breviora 6 mm. longa. *Ovarium* 5 mm. longum, compressum, adpresse pubescens, in stylo robusto 3 mm. longo contractum. *Fructus* 2·5–3·5 cm. longus 4 mm. latus, late linearis, stylo persistente indurato robusto 3·5–4·5 mm. longo munitus. *Semina* orbicularia, ala membranacea hilo excepto circumcincta.

Morocco. El Khirona ; in lapidosis siccis ; Apr. 1913, *Pitard* 3093. Djebel Melab ; in rupestribus ; Apr. 1913, *Pitard* 3090 (Typus in Herb. Kew.). Near Erfoud ; Mar. 1937, *Trethewy* 178.

Algeria. Biskra ; sur les bords des torrents ; 21 Apr. 1853, *Balansa* 885. In glareosis alvei exsiccati amnis Oued en Nsa ad el Fareh, in ditione Wzab ; 19 May 1858, *Kralik* 13. Oued Wzab ; 8 May 1858, *Cosson*.

The Algerian specimens quoted above are included with some slight hesitation but the differences observable in this material (more twiggy habit and slender fruits) are not of such a degree as to warrant specific separation. In all these species of *Farsetia* investigation is considerably handicapped by the fragmentary nature of the herbarium specimens, the difficulties of correlation between young and old plants, and between flowers and fruits. Such points serve to emphasise the very valuable work that can be done by a collector who is resident in a given area the whole year round. His discoveries of unknown species might be negligible, but additions to the knowledge of those long since described would be of inestimable value.

The illustration of this species given in Cosson's work (l.c.) under the name *F. linearis* is excellent.

Sarcochilus dalzellianus *Santapau*, nom. nov. *Micropera viridiflora* Dalz. in Kew Journ. Bot. **3** : 282 (1851) ; *Saccolabium viridiflorum* Lindl. in Journ. Linn. Soc. **3** : 36 (1858) ; *Sarcochilus viridiflorus* Cooke, Fl. Pres. Bomb. **2** : 697 (1907) (non Hook. f., 1890).

The combination *Sarcochilus viridiflorus* was first made by Hooker f. for a Ceylon plant (*Aerides viridiflorum* Thw., 1864), which is quite distinct from the Bombay species. Cooke's combination is, therefore, a later homonym which cannot stand in accordance with the present rules.

H. Santapau.

Flora of South Australia*.—The appearance of the second part of the second edition of J. M. Black's useful Flora of South Australia is very welcome. It includes the important families *Chenopodiaceae*, *Proteaceae*, *Leguminosae* and *Rutaceae* and it continues along the same lines as Part I which appeared in 1943. There are numerous illustrations which help considerably in using the flora for the determination of species. So far as can be seen the results of the latest work on various genera have been incorporated.

*Flora of South Australia, Part II, Casuarinaceae–Euphorbiaceae. 2nd Edition. By J. M. Black. Adelaide, K. M. Stevenson, Government Printer, 1948, pp. 255–521, figs. 303–684. Price 8s. 6d.

A NEW SPECIES OF TRICALYSIA FROM TANGANYIKA TERRITORY.

J. P. M. Brenan.
(Imperial Forestry Institute, Oxford).

Tricalysia gilchristii *Brenan*, sp. nov. ; a *T. kirkii* Hiern ramulis pubescentibus, foliis multo minoribus ovatis vel elliptico-ovatis, subula stipularum multo breviore, calyce minus sericeo, placentis ovarii biovulatis differt.

Frutex. *Ramuli* pilis albidis breviter pubescentes, graciles, 1–3 mm. crassi, novelli ± bisulcato-compressi, mox obscure angulati et cortice brunneo vel in ramulis vetustioribus griseo-brunneo longitudinaliter rimoso hic illic desquamante obtecti. *Folia* petiolata, petiolo 4–6 mm. longo supra anguste canaliculato subtus rotundato more ramulorum vestito ; lamina chartacea vel rigide chartacea, ovata vel elliptico-ovata, apice obtusa haud vel vix acuminata, basi rotundata et in petiolum abrupte attenuata, 2·2–5 cm. longa, 1·2–3 cm. lata, supra costa puberula excepta glabra siccitate nitidula et brunneo-viridis vel atrobrunnea, subtus olivaceo-viridis in costa et nervis lateralibus minute pubescens aliter glabra, marginibus pilis brevibus persistentibus ciliolatis, costa supra impressiuscula subtus prominente, nervis lateralibus primariis utrinsecus 5–7 sursum curvatis et a margine circiter 1 2·5 mm. arcuato-anastomosantibus, cum secundariis et venulis irregulariter reticulatis utrinque prominulis ; stipulae diu persistentes, late ovatae, scariosae, 2 mm. longae, 1·75 mm. latae, extra puberulae, apice in subulam acutam 1–1·5 mm. longam productae. *Inflorescentiae* axillares, sessiles, solitariae vel binae, uniflorae vel cymoso-congestae et usque triflorae, floribus sessilibus albis ; bracteolae imbricatae, scariosae, extra densiuscule puberulae, inferiores in cupulam circiter 1 mm. altam margine biapiculatam apiculis 0·5–1·5 mm. longis connatae, superiores ovarium arcte amplectentes, ± bilobatae lobis circiter 1·5–2 mm. longis. *Calyx* textu atque indumento bracteolis similis, ellipsoideus, 2·75 mm. longus, 1·25–1·5 mm. latus, alabastrum corollae fere omnino occludens, apice tantum os parvum 4–5-denticulatum praebens, serius apertus, bilobatus, 3 mm. longus (ovario incluso), tubo brevissimo, lobis late ovatis 1·5–2 mm. longis basi circiter 2 mm. latis apice 2–3-apiculatis. *Ovarium* glabrum, campanulatum, 1 mm. altum, apice 1·4 mm. latum, ovulis pro loculo 2 collateralibus. *Corolla* alabastro circiter 2 mm. longa, ellipsoidea, sub anthesin tubo 3 mm. longo sursum ampliato atque ibi ad circiter 1·75 mm. lato extra intusque glabro, lobis 4–5 ut videtur patentibus vel reflexis late ellipticis apice obtusis 4 mm. longis 2·25 mm. latis intus glabris extra sparse puberulis. *Stamina* 4–5, exserta, filamentis 1·5–2 mm. longis 0·4 mm. latis, antheris 1·25 mm. longis 0·6 mm. latis. *Stylus* circiter 6 mm. longus, glaber, apice bifidus, lobis 1 mm. longis. *Fructus* (? nondum maturus, unicus tantum visus) siccitate ellipsoideus, glaber, 5 mm. longus, 3·5 mm. latus.

Tanganyika Territory. Southern Highlands Province, Iringa District : Kivere Old Forest, near Mufindi, 14 Oct. 1946, *B. Gilchrist in Tanganyika Territory Forest Herbarium No.* 1728 (typus in Herb. Kew.) :— forest undershrub with conspicuous white flowers.

This new species is named after my friend Mr. Bernard Gilchrist, Assistant Conservator of Forests, Tanganyika Territory Forestry Department, who has made a useful collection from the region of Mufindi.

T. gilchristii falls into an interesting group of the genus in which the calyx completely or almost completely encloses the corolla in bud and afterwards becomes split into two deep lobes, the true calyx-lobes being only represented by nerves running up the calyx or by minute denticles at the apex. Most of the species of this group (e.g. *T. pachystigma* K. Schum. and its relatives) have comparatively large corollas densely appressed-silky outside all over. *T. gilchristii* differs from these by its much smaller corollas sparsely puberulous only on the lobes outside and otherwise glabrous, and can therefore apparently be brought near only to *T. kirkii* Hiern, from which it differs in the points mentioned in the diagnosis.

The Royal Botanical Expedition to New Spain.—The names of Sésse and Mociño will always be honoured by those who work on the flora of Mexico, the West Indies, and Central America. Dr. H. W. Rickett, Bibliographer of the New York Botanical Garden, has had access to and has translated numerous documents regarding the history of the botanic gardens and the Royal Botanical Expedition, 1788-1820, from the national archives of Mexico, Archivo General de la Nación, housed in the Palacio Nacional on the Plazo Mayor, Mexico City. The results of Dr. Rickett's researches are now published* in a very readable form with full documentation and numerous quotations and annotations.

Chapters I. and V. deal largely with the vicissitudes of botanic gardens, and particularly of the Royal Botanical Garden, in the capital city of New Spain. Vicente Cervantes (1755–1829) was appointed professor in the new botanical garden and arrived in Mexico in or near 1785. He and Sessé, who accepted the directorship, had to fight hard to obtain a suitable site, to equip and staff the garden, and to make certain of its future maintenance. It is noted that one feature of the Royal Order in which the Garden was chartered was that " means had to be found to render the institution self-supporting and to reimburse the Crown for the cost of construction". A bull-ring, a state lottery, inspecting of drug-shops, and financial support from the University were proposed. It was also suggested that " vagrants, drunkards, and other delinquents were to be used to carry manure and rock, to dig tanks, and to perform other manual work, which would not only ensure cheap labor but would tend to correct these vices so prejudicial to the state". All these schemes failed to mature and the upkeep of the Botanical Garden and the salaries of the officials were constant worries to Sessé and Cervantes. It is, however, probable that the official records are over-weighted with administrative matters and one would have welcomed much more information on the botanical side, such as lists of the plants cultivated and further details of the botanical activities of members of the staff. Some interesting information on teaching methods is given.

*H. W. Rickett : The Royal Botanical Expedition to New Spain, Chron. Bot. **11**, No. 1 (1947). $2.50.

The history of the botanical exploration of Mexico by Sessé, Mociño, and other members of the Expedition is discussed at some length in chapters II., III., IV., and VI. It is a record of ups and downs, of official obscurantism, and of personal animosities. The maps of the routes followed (pp. 24, 28) should be of very considerable use to taxonomists studying the Mexican flora. These chapters on the botanical exploration of Mexico make very amusing reading to anyone interested in the biography and psychology of botanists and their relations to government officials. It is, for instance, recorded that " José Mariano Moziño Suares Losada . . . . . had married nine years before. Two years later we find him studying botany in the Royal Botanical Garden of Mexico ; and the next year his wife sued for divorce". Again, there were " eternal disputes about pay and allowances " and " in several letters Sessé told Senseve [an unsatisfactory member of the Botanical Expedition] that he could go back to Mexico [from Cuba] alone if he must (and doubtless added in his thoughts another place he could go to)".

The tragedy of the final years of Sessé and Mociño after their arrival in Europe when they were" crushed by the official lack of interest in their achievements and plans " is outlined in a final chapter. The labour, enthusiasm, time, and money spent on " The Royal Botanical Expedition to New Spain " gave relatively poor permanent returns.

It is somewhat surprising that Dr. Rickett does not quote in his list of references the useful paper by T. A. Sprague, " Sessé and Mociño's Plantae Novae Hispanicae and Flora Mexicana " in Kew Bull. 1926 : 417–425.

W. B. Turrill.

A Prodromus of the British Hieracia*.—This new account of our second largest genus of phanerogams, completed under all the difficulties of war-time, will be welcomed by British botanists as a remarkable achievement. The author, who did not live to see the publication of his work, had been collecting, cultivating and studying hawkweeds for very many years. He began to write the text in 1936 and had read a good deal of the printer's proof at the time of his death in November, 1947, when he was in his eightieth year. Although the work has the appearance of a monograph, the author knew that it should be regarded as a " prodromus " : it was undertaken in the hope of reducing the existing confusion and establishing a new basis for further study of the genus in Britain. He also knew that there would be many future additions to the forms which he described.

The Prodromus recognizes 260 species, of which 180 are presumed to be endemic, and is illustrated by 17 plates with 35 line drawings, from the author's hand, of representative species of the Sections. The main outlines and order of Zahn's classification are accepted, but the arrange-

*By H. W. Pugsley, B.A. Published as vol. 54 of the Journal of the Linnean Society of London (Botany). London : sold at the Society's Rooms, Burlington House, Piccadilly, London, W.1, and by Longmans, Green and Co. Ltd., 6 and 7 Clifford Street, W.1 (1948). Price 60s.

ment is made much more satisfactory for the purposes of a handbook of British hawkweeds by the refusal to recognize multitudes of subspecies under " capital species " and by the rejection of dumps of " Zwischenarten " outside clear-cut groups. The species are placed in 17 main Sections within the two subgenera *Eu-Hieracium* and *Pilosella*. Most of these Sections are divided into Series or, in the case of the huge Section *Vulgata*, into Subsections and Series. It may be remarked that these " Series " are never properly defined, since no authorship is attributed to them : it is never made clear if they are all new, or which are new, since none is accompanied by a Latin description ; but it is at least made evident that each " Series " represents a " Grex " species, either one of those of Zahn's Monograph or a new one chosen by the author himself but not treated as possessing a special nomenclatural rank since no new combination is made. It is perhaps unfortunate that this is nowhere explained in the introductory sections of the work. A considerable number of varieties and forms are admitted. Beginners will regret the disappearance of the familiar name *boreale* from our list, and will note the division of *H. umbellatum* into two species.

The author gives a preliminary conspectus of all the species within their groups, and in the body of the text there are keys (or rather conspectuses) to the species of each group. Each species is given a good, uniform description, but the somewhat strange use of italics will bother some readers. The description is followed by notes and comments, distribution in Britain and general distribution. The specimens cited are for the most part those in the Herbarium of the British Museum or the author's own collection (presented to that Herbarium by the terms of his will), and no published records have been utilized.

Apart from the taxonomic section, which comprises the bulk of the volume, the author gives discussions of the history of the genus, both as a whole and in Britain, and of its morphology and classification. He introduces the structure of the alveoli of the receptacle as a taxonomic character new to most British botanists, and gives line drawings of the four main types of alveoli. At the end of the work comes an interesting chapter on the distribution of *Hieracia* in Britain and their origin, followed by a table showing the distributions of British species of the subgenus *Eu-Hieracium*. The very large number of the latter, in contrast with the very small number of species of the subgenus *Pilosella* (which, it is hinted, may be separable as a genus), is noteworthy. The author is, of course, aware of the significance of parthenogenesis, but he does not discuss the possible influence of polyploidy on the multiplication of species and the abundance of clones in certain areas, and he postulates isolation as the probable cause of the relatively small number of species found in Ireland. Elsewhere he notes that no British plants seem to have been examined cytologically.

This is the most considerable work on a genus of British phanerogams that has ever been published. It is to be hoped that it will indeed stimulate the study, and not the reckless collection, of British hawkweeds. It must be added that, if the road is now clearer, it is not easier : the author never intended it to be so, and would expect his book to be useful, not to the collector of random specimens, but to that devoted and painstaking *élite* of which he was an honoured member. N.Y.S.

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